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Editorial Notes

Pioneer Work

"HISTORY repeats itself and there is nothing new under the sun, since a reference to 'King's Treatise on Gas' published in 1878 gives illustrations of both inclined and vertical retorts dating about 1804 or 1805." Thus Mr. Charles Dru Drury in his Address for the second time as President of the North of England Gas Managers' Association at the autumn meeting at Sunderland on Friday last. Mr. Drury's connexion with the Gas Industry commenced as far back as 1880 and it is just forty years since he was first elected President of the Association; his early recollections of the Industry, some of which he recounted in his Address last week, are full of interest and call attention by contrast with present-day practice to the enormous strides which have been made since those days. Mr. Drury traced the development of carbonizing plant from the horizontal retort, through the inclined retort, to the intermittent and then the continuous vertical systems. He reminded us that inclined retorts were brought into practical use by M. Coze, of Rheims, in 1885, and that it was the German Gas Industry which developed the intermittent vertical retort, in the first instance at Dessau. It was not till these systems had been proved abroad that they were installed in this country, intermittent verticals on the Dessau principle being first introduced in 1910 by Mr. Drury shortly after his appointment as Engineer to the Sunderland Gas Company. We may recall that for his Paper on this installation to The Institution of Gas Engineers in 1911 he was awarded the Institution Gold Medal and also the H. E. Jones Medal.

Much pioneering and development work on carbonizing plant was carried out abroad, but we are glad that Mr. Drury should point to the fact that the continuous vertical retort, the enclosed system in which coal goes in at one end and cool coke is discharged at the other end, is essentially a British achievement—a matter which is apt to gain insufficient recognition.

There was nothing particularly new in the vertical retort as such; the novelty lay in continuous operation, and this was the contribution of English engineers to the development of the carbonizing process. Sir Arthur Duckham and John West were the pioneers, and their work bore the unmistakable stamp of originality. Maybe they were prompted to the new step by the reappearance of the vertical retort on the Continent, but there were other factors which enabled them to translate their ideas into practical form. There were the improvement and development of refractory materials, the revision of the gas standards, which was largely responsible for the rapid advance effected in the continuous vertical retort and the application of the steaming process, and the development of coal-handling machinery, rendering the supply to overhead bunkers no more difficult than to the hoppers of the charging machines for the horizontal retorts; and the British Gas Industry was not slow to take advantage of the new system of continuous carbonization and to help in perfecting it.

The All-Gas House

WE are working for and looking forward to the time when all domestic heat requirements, cooking, water heating, and room warming, will be met by gas. Mr. Drury expressed his belief that in the complete gasification of coal lies the future of the Gas Industry, and this may well be. Under present conditions, however, we cannot sell gas cheaply unless we obtain, as we are obtaining, a substantial revenue from the other main smokeless fuel—coke. Nor is the all-gas house possible unless gas is offered at a price considerably below the quoted flat rate price. A two-part tariff or some other attractive form of charge is essential, and obviously the better the coke market the greater is the opportunity for adopting methods of charge which render the all-gas house an economic proposition. The production at gas-works of both solid and gaseous fuels, to some extent competing with one another, is, in the opinion of Mr. Drury, an anomaly. We would say that under present conditions this dual production is the most economical way of making gas; and this in no way suggests that the efforts being put forward to develop a complete gasification process which will result in a cheaper gaseous

therm are not worth while. They are, and they should be extended.

To the extent that the public is educated to the advantages and saving in labour afforded in the all-gas house so the use of solid fuel in any form will decrease; and as we have stressed in these columns, and as Mr. Drury pointed out once again in his Address, given a progressive tariff the cost of fuel in an all-gas house need in a very great many cases be no more, or very little more, than that of solid fuel. Where in excess, that small excess is more than counterbalanced by the great saving in labour, convenience, and absence of dirt. The ordinary middle-class householder has in mind his experience of the use of gas on the flat rate of, say, 8d. a therm; he does not think in terms of half-price gas. It may be taken as an approximate figure that each open firegrate burns 1 cwt. of coal a week during the heating season. If the cost of coal—as it is in the London area—is 2s. 6d. a cwt. and he has two coal burning grates, his annual cost is £7 10s. for a thirty-week season. Let his other equipment be gas fires in two bedrooms, a coke boiler for water heating, and a gas cooker. For reasonable hot water service his boiler will require at least 1 cwt. of coke a week; there will also be gas poker consumption on the flat rate. It can be shown that a family of four requiring 60 gallons of hot water per day can be satisfactorily catered for at 2s. 6d. a week with gas at 4d. a therm—no more than the cost of coke. Gas at 4d. a therm, it can be demonstrated too, can displace coal in the open grate either at no extra cost or at little extra cost. Now let the householder total his annual gas bill for cooking, bedroom fires, and poker, and he will no doubt find that half this amount (gas at 4d. instead of 8d. a therm) will offset his standing charge on a two-part tariff. This is the method of approach which the Gas Industry should foster among its salesmen and encourage them, by attractive tariffs, to sell the all-gas house to the right type of consumer in a most extensive field. And where incomes are extremely limited, and where as in working-class houses the equipment is not so extensive, it has been amply demonstrated that under a two-part tariff for gas a combination fuel service of gas and coke can be had at no extra cost to the consumer of raw coal.

Calorific Value

Of late we have heard a good deal on the subject of declared calorific value, and on several occasions recently in these columns we have discussed the question, querying whether there is real justification for the many and varied declared values within a comparatively narrow range. An analysis taken out by Mr. E. G. Stewart showed that last year the value of 500 B.Th.U. covered 39% of gas sales, the range 470-480 B.Th.U. 28%, and the range 450-460 B.Th.U. 22%. Declarations below 450 B.Th.U. comprised only 4·4% of sales. By far the greater portion of gas sold by the Industry is within the range of 450 to 500 B.Th.U. In his Paper to the North British Association of Gas Managers last month Mr. J. E. Blundell recalled that the Report of the Fuel Research Board of 1919 suggested that, though gas undertakings should be free to declare the calorific value they considered to be the best and most economical in their particular circumstances, the number of standards for the declared calorific value should be limited. The four standards suggested were 400, 433, 466, and 500 B.Th.U. Mr. Blundell gave it as his opinion that five values would suffice—500, 475, 450, 425, and 400 B.Th.U. We think that three, or four, at the most, values would well suffice, and the three we should favour would be 500, 475, and 450 B.Th.U. If a fourth, then 425 B.Th.U.

During the past few weeks we have recorded several changes in the declarations made by gas undertakings. The tendency is for the range to become narrower, but out of the last dozen changes there are no fewer than seven different values, some of these values differing by as little as 5 B.Th.U. The tendency is upwards towards the range 475 to 500 B.Th.U., but some of the changes are a little difficult to understand. The coke market, benzole recovery, centralization of gas manufacture, unification of control, steaming, types of coal—all have their influence on declared values, but what influenced one undertaking to change from 475 to 480 B.Th.U., with straight horizontal plant? And it will be agreed that 480 B.Th.U. in horizontals without dilution with water gas implies a considerable content of inerts. Then we have another undertaking, again with horizontal plant, raising the declared value from 450 to 495 B.Th.U. What was the compelling factor which resulted in preference for 495 B.Th.U. rather than 500 B.Th.U.? A third undertaking, also with horizontals only, changes from 460 to 470 B.Th.U. Why not to 475 B.Th.U.? Other changes are upwards from 450 to 475, from 475 to 500, two from 450 to 500, and two downwards from 500 to 475 B.Th.U.

Gas Quality

We are aware, of course, that calorific value is not the only criterion of the satisfactory performance of gas in consumers' appliances. Specific gravity and flame characteristics must be taken into account, as also must the maintenance of constant pressure at the appliance. The Industry is busy researching on these "characteristics," and we shall hear about how the work is progressing at the Research Meeting of The Institution of Gas Engineers next month. It is being borne in upon the Industry that constancy of quality of gas satisfactory in use is essential. All the same, calorific value is an important factor; it is certainly important from the consumer's point of view in that he is charged for gas on the basis of heat content. Gas making is a wonderfully flexible process. This flexibility is the Industry's greatest asset. Changes can readily be made to meet alterations in market conditions. We may, indeed, in the future see resort to the partial firing of retort settings with coal gas during periods of low demand. We must retain this flexibility, but in our opinion this can be done without such a bewildering variety of calorific value declarations—a matter of a few B.Th.U. or so variation among undertakings carbonizing the same or similar types of coal in the same or similar systems of carbonizing plant. And we think that standardization on a limited number of calorific values would help the manufacturers of gas consuming appliances. The values of 500, 475, and 450 B.Th.U. would appear to cover the types of coal carbonized in Great Britain.

As we have said, calorific value is not the only criterion of the satisfactory performance of gas in consumers' appliances. It might well be, however, that some measure of standardization on the lines we suggest would focus attention on the other criteria and would be another step towards planning on regional lines. From uniformity in calorific value the next step would be constancy in specific gravity and "characteristics"; and the flexibility of modern carbonizing plant does render this constancy possible. There is, for example, the possibility of operating a carbonizing plant under steaming conditions making gas of the declared calorific value, and then, when peak load arises bringing coal throughputs and calorific values of the coal gas up to the maximum and diluting with blue water gas made externally. This would be one way of meeting increased gas load while maintaining

regular "characteristics" of the gas made. Gas appliances have been improved enormously during recent years and many refinements have been added. Their successful operation demands gas of constant composition. The public, too, have been led to expect of gas a service of a standard far in advance of what they obtained a comparatively short time ago. The need for gas of constant quality is such that if it proves to be the case that constant-quality gas involves in its manufacture a slightly increased cost per therm, this slight increase will have to be faced. Any increase would, we think, be more than offset by the advantages of trouble-free service on the district and absence of complaints, to attend to which costs money.

Economic Enquiry

At the Institution meeting last June Sir Frederick West, in the discussion on the Paper presented by Mr. F. B. Richards, referring to the variables which have to be taken into account in the choice of carbonizing plant—the coal to be carbonized, the gas to be made, the type of coke required, local conditions—said: "Perhaps some of this variation is to some extent unnecessary. Is it certain that the liberty conferred upon the Industry by the Act of 1920 with regard to the calorific value has not degenerated into licence? I cannot help thinking that an economic enquiry might be instituted into the question whether there is not one or a very few calorific values which might be adopted for the whole country or for large sections of it." We think that standardization on one calorific value would be a mistake; it would not cover the three broad differences in the types of coal carbonized by the Industry. The economic enquiry suggested by Sir Frederick West appeals to us, however, and we are of opinion that the result of such an enquiry would be to show that the variations in declared calorific value, small variations within a narrow range, are unnecessary, and that standardization on the lines we have outlined would prove a useful first step in the supply of gas of constant quality having the characteristics which will ensure the satisfaction of the more exacting public of to-day—a step useful alike to gas undertaking and manufacturer of gas-making plant and gas-using equipment.

Need for Publicity Effort

It is more than ten years since the gas ignited coke grate was introduced to the public, which makes it all the more surprising to find the number of people who have never heard of it and the economy and other advantages which its installation offers. The fact is that in general gas undertakings have not taken up its sale very seriously. Without much publicity, and without establishing a special section, adequately staffed, in the sales department, they have allowed the coke grate to sell itself, and this is not the way to promote sales. The quality of coke has greatly improved of recent years. Efforts have been made, with a measure of success, to build up public opinion against the smoke evil, and these efforts are shortly to be greatly extended. Every gas undertaking will, we hope, do its part in making the public smokeless-minded, and it is in its interests to push the sale of coke as well as the sale of gas; a good coke market means lower gas prices. The potential market for coke and for gas is enormous, and the most remunerative market for gas coke lies in the domestic field. The constituent members of the London and Counties Coke Association have given an indication of what can be done. During the past three or four years about 215,000 coke grates have been installed in the area covered by the Association, and it may be taken that each grate consumes from 30 to 40 cwt. of coke annually—in total a matter of from 320,000 to 430,000 tons. But this figure is negligible when contrasted with the millions of tons of raw coal being burned yearly in the domestic open firegrate. The immensity of the field should encourage gas undertakings, as purveyors of two forms of smokeless fuel, to tighten up their coke sales organizations and to increase their publicity and propaganda work aimed at the sale of gas coke of good quality.

Lowering Maintenance Costs

There can be no doubt that considerable savings can be effected in the maintenance costs of structures on gas-works by judicious painting—suitable paint properly applied. It is certain, too, that the first cost either of the paint or its application ought not to be the determining factor. Experience has shown that there is every justification for paying what at first sight may appear to be comparatively high prices for good paint. The gas engineer, we suggest, has much to gain by co-operation with the paint manufacturer. He should study the local conditions obtaining on the site and take all possible steps to ensure that the performance of the selected paint is not prejudiced by neglect of the preparation of the surface, on which so much depends. Thousands of pounds must have been lost through inefficient primary painting. The influence of good painting in the preservation of iron and steelwork was touched upon last week by Mr. A. W. Attwood, of Coventry, in his Presidential Address to the Midland Juniors. He explained that Coventry experience has shown that a good quality liquid red lead is the most suitable for a primary coat on steelwork and cast iron. As a second coat silica graphite paint has been adopted largely at Coventry—a paint which when dry has a rubber-like texture. Mr. Attwood pointed to the mistake of comparing paint prices on a weight basis, without consideration of the specific gravity of the paint; a low gravity paint will cover a greater area per gallon than a high gravity paint.

The importance of painting was only one of several subjects discussed in the Address. He gave an interesting account of practical value on the purging of a holder by one of the inert gas machines which are now available on hire at small cost and enable the task to be carried out with complete safety; and he briefly described the new installation of Glover West verticals which is being erected at the Foleshill Works—a measure rendered necessary by the phenomenal growth of the Coventry Gas Undertaking in recent years. The annual increase during the past three years has averaged 7·4%, and since 1930 the number of consumers has grown from 47,676 to 71,217 (of whom, by the way, 58,209 are prepayment consumers). The prospects at Coventry—more consumers and greater gas output—are very bright indeed, and the present activities at the works in connexion with new plant will ensure that these consumers are afforded a satisfactory gas service.

Merited Appreciation

We like to see appreciation of a gas engineer by the local Press. It almost certainly implies that the public are satisfied with their gas undertaking, particularly when that undertaking is municipally owned, and consequently regarded as fair game for grumbles.

We are particularly pleased to see Mr. G. E. Currier eulogised in connexion with the big reconstruction scheme which he has now completed; the *Bradford Telegraph and Argus* headed its editorial comment "Gas Manager's Genius." Having taken a prominent part in the modernization of the Smethwick Undertaking, Mr. Currier had two years at Bradford with Mr. E. Crowther before the latter's appointment to Salford in 1934. Mr. Currier then succeeded him as Chief at Bradford, and the following year he was confronted with the problem of the manufacturing plant, when he prepared no fewer than five schemes of reconstruction, including capital and manufacturing costs, for the consideration of the Gas Committee. They finally adopted the scheme which Mr. Currier recommended, resulting in the centralization recently completed at Birkshall, which was described in detail last week. The work was carried through entirely without engaging the services of a consulting engineer.

Mr. Currier is yet another gas engineer to acknowledge the debt he owes to the Birmingham Gas Department. The early training he received there during 11 years in various engineering positions has stood him in good stead in his subsequent appointments.

Personal

We apologise to all concerned for the report which appeared in last week's "JOURNAL" of the wedding of Mr. Reginald Harry Banks. The bride was Miss Winifred Mary Biggin, and we greatly regret not having noticed that the report which reached us was a garbled one.

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Mr. H. STONEWALL JACKSON, for many years a Director and Manager of Messrs. Spencer-Bonecourt, Ltd., has recently retired owing to indifferent health. Mr. H. J. WADDINGHAM, Secretary of the Firm's parent Company, Messrs. Babcock & Wilcox, Ltd., takes his place on the Board, Mr. A. E. WATKINS becomes Manager, and Mr. A. TARRANT Chief Draughtsman.

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Mr. B. B. TAYLOR, Engineer, Manager, and Secretary of the Quakers Yard Gas and Water Company, has retired, and the Directors have promoted their Sales Manager, Mr. GORDON BEECH, to be Engineer and Secretary, and Mr. W. J. MASON to be Works Manager, as from the end of October.

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Mr. A. S. KEAY, of the Keith Gas Company, has been appointed Manager to the Inverbervie Gas Department.

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Mr. J. H. PATERSON, Engineer, Manager, and Secretary of the Ludlow Union Gas Company, has retired from the Gas Industry. We learn he has purchased the business of Langton Hall Hotel, Ltd., Durley Chine Road, Bournemouth. Mr. Paterson was trained with the Waterford and Deal Gas Companies, and before going to Ludlow was Technical Assistant with the Deal and Dover Gas Companies and Assistant Manager to the Hessle (Yorks.) Gas Company. He was an active member of the Chamber of Commerce and Rotary Club at Ludlow. For three years he has been the Hon. Secretary and Treasurer of the Midland Association of Gas Engineers and Managers. His late colleagues in the Industry will wish him success in his new sphere, in which, he assures us, he will always be pleased to see his friends.

Institution of Gas Engineers

Session at Public Health Exhibition.

A Session under the auspices of The Institution of Gas Engineers has been arranged for the afternoon of Friday, Nov. 18, in connexion with the forthcoming Public Health Exhibition, which is to be held at the Royal Agricultural Hall, Islington, from Nov. 14 to 19. Mr. R. Robertson (President of the Institution) will take the chair, and two Papers will be presented: (1) "Smokeless Housing Schemes" by Miss Elizabeth Denby (Leverhulme Fellow); and (2) "Gas in the Service of Public Health" by Mr. W. L. Howe (Industrial Sales Engineer to the Nottingham Gas Department). The Session will be held in Hall No. 4, commencing at 3 p.m.

Gas Engines for Small Craft

At times like these, the thoughts of everyone naturally turn to the possibility of using our home resources to the utmost. In a Paper read on Oct. 11 before the Institute of Marine Engineers, Mr. F. J. Gibbons, of the Premier Engine Company, reviewed the possibility of the application of gas made from home-produced fuel to marine propulsion. He said that it is well-known that such experiments as those of the "Capitaine" and the "Rattler" in the early part of the century had shown conclusively that the gas producer and gas engine were at least technically satisfactory for marine propulsion; while more recent experiments with barges and light cargo ships on the Continent, and dredgers and similar vessels in the tropics, had shown that propulsion by means of gas was to-day not only technically, but also economically satisfactory. Examples, illustrated by lantern slides, were given of these latest developments.

The author went on to say that the fuels which were at present being used for that purpose abroad were coke, anthracite, and wood waste; in this country, the general availability of coke would probably result in its being the preferred fuel, although anthracite would almost certainly be used in ships sailing from ports on the west coast, while, by means of the use of the downdraught producer, it should also be possible to make use of bituminous coal. The author concluded by showing the proposed layout of producers and engine for a collier of approximately 1,000 h.p., and pointed out that producer gas propulsion should have particular appeal to ship-owning coal and gas companies.

Forthcoming Engagements

October.

13.—Midland Association.—Autumn General Meeting, Grand Hotel, Birmingham.
14.—Manchester Association.—General Meeting, Midland Hotel, Manchester.
15.—Western Juniors.—Meeting at Bath. Address by Mr. R. Robertson, President of the I.G.E.
18.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
18.—London Coke Committee.—Meeting at Gas Industry House, 3 p.m.
18.—B.C.G.A.—27th Annual General Meeting, Dorchester Hotel, Park Lane, W. 1.
19.—London and Southern Juniors.—Visit to Brentford Works of the Pyrene Company and to the Gas Fair at the North London Exhibition.
20.—Eastern Counties Association.—Autumn Meeting at Gas Industry House, 2 p.m.
20.—Midland Juniors.—Visit to West's Gas Improvement Company, Ltd., Manchester.
20.—Southern Association (Western District).—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m. Committee Meeting, 12 noon.
22.—Scottish Western Juniors.—Visit to Douglas Firebrick Company, Ltd., Dalry.
26.—B.C.G.A.—Yorkshire District Conference at Rotherham.
27.—B.C.G.A.—Midland District Conference at Shrewsbury.
27.—Coke Oven Managers' Association.—Annual Dinner, Hotel Victoria, Northumberland Avenue London.
31.—L.C.C.A.—Executive Committee, 11 a.m.; Central Committee, 12 noon; Annual Luncheon, May Fair Hotel, 1 p.m.; Annual General Meeting, 3 p.m.

November.

1.—I.G.E.—Council, The Institution of Mechanical Engineers, 9.30 a.m.; Council (continued), the Institution of Mechanical Engineers, 4.30 p.m.
1-2.—I.G.E.—10th AUTUMN RESEARCH MEETING at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W. 1.
3.—Midland Juniors.—Paper by A. V. Wainwright on "The Remote Control of a District Gasholder."
3.—S.B.G.I.—Autumn General Meeting, May Fair Hotel, W. 1. Council Meeting at 56, Victoria Street, S.W. 1, 11 a.m.
4.—B.C.G.A.—Executive Committee, 11.30 a.m.
5.—Scottish Eastern Juniors.—Tour of Works in Edinburgh Using Town Gas for Industrial Purposes.
8.—London and Southern Juniors.—Discussion on "Technical Education in the Gas Industry," introduced by Dr. J. N. Long.
12.—Scottish Western Juniors.—Address by W. R. Drummond on "The Work of the National Gas Organizations in Scotland."
17.—Midland Juniors.—Visit to John Harper & Co., Ltd., Willenhall.
18.—I.G.E.—Session at Public Health Exhibition, Agricultural Hall, Islington, 3 p.m.
19.—Western Juniors.—Visit to Portishead Generating Station, Bristol. Paper by H. C. Widlake, of Plymouth.
25.—London and Southern Juniors.—Annual Dinner and Concert, Empire Restaurant, Victoria, S.W. 1.
26.—Scottish Western Juniors.—Visit to Greenock Corporation Gas Department.

Amalgamation and Grouping

Coatbridge and Airdrie.

At a meeting of Airdrie Town Council on Oct. 6 it was decided to rescind a previous decision to modernize the Municipal Gas-Works and to enter into immediate negotiations with Coatbridge Gas Company for the sale of the Undertaking.

Readers will recall that some time ago an offer by the Coatbridge Company to acquire the Airdrie Undertaking was made, the Company offering to pay off the Airdrie outstanding debt of approximately £20,000, to compensate the officials who would be displaced, and to supply gas to Airdrie consumers at the Coatbridge rates, equivalent to about two-thirds of the Airdrie charges. This offer was turned down and Airdrie Town Council agreed to modernize their own plant at an estimated cost of £20,000, sanction for the borrowing of this money to be obtained from the Secretary of State for Scotland.

News of the Week

To Celebrate its Centenary, the Kirkham Gas Company is holding an exhibition in the Ambulance Hall.

The Yorkshire Industrial Centre has transferred its headquarters from the New Wortley Works to the Meadow Lane Works, Leeds, 11.

By a Considerable Majority, Hawick Town Council have adopted gas public lighting for a new housing scheme in Thurnwood Park.

An Entry entitled "Romance of a Lump of Coal" secured first prize for the Taunton Gas Company in the trade turn-out section of Ilminster and District Carnival on Oct. 6.

Now that the Crisis has Passed, Hinckley Gas Department have decided not to obliterate the name "Hinckley" which is painted on top of the gasholder. Should the need arise the name could be painted out in two hours.

In an Exhibition organized at Loughborough in connexion with the jubilee celebrations of the Borough are the original cheque for £88,556 17s. 9d., which the Corporation paid for the Gas-Works in 1900, an 1880 gas cooker, an 1870 gas fire, and a radiator made in 1850.

The Wigan Corporation Gas Department are holding an exhibition of modern gas appliances all this week from Monday, October 10, to Friday, Oct. 14, in conjunction with which lectures are being given twice daily by Miss M. Whittington, of the Radiation Research Kitchen.

Fifty-seven Years' Continuous Service with one firm is the proud record of Mr. G. Barge, who recently retired after this long spell at the Birmingham Works of Messrs. W. Parkinson & Co. On behalf of the Directors and employees, presentations were made to Mr. Barge by Mr. W. W. Parkinson.

Sanction has been Given by the Ministry of Health to the Nelson Town Council to borrow for the cost of new coke-handling plant at Brierfield Gas-Works, less the amount outstanding on the existing plant. The Gas Committee had previously decided that the amount should be paid out of revenue account.

A Lecture on Refrigeration, embracing such aspects as operation, installation, and maintenance, was given to the fitting and distribution staffs of the Leamington Priors Gas Company on Oct. 3 by Mr. Sherlock, of Electrolux, Ltd., at the Company's showrooms. The Address gave rise to a good discussion.

Application to the Ministry of Health for consent to the borrowing of £12,000 for gas mains is being made by the Lincoln City Council. The Ministry has intimated that one of their inspectors will hold an enquiry into the Council's application to borrow the sum of £62,000, the cost of a proposed new gasholder.

Successful Architects in a recent competition for a scheme for new Council Offices at Adwick-le-Street were Messrs. Shapley and Davison, AA.R.I.B.A., of 22, Queen's Square, Leeds. Friends of Mr. C. S. Shapley will be pleased to hear of this further success for his son, Mr. Ronald S. Shapley, in a contest which was open to all practising architects in the West Riding.

A Wide Range of cookers, washing machines, fires, refrigerators, water-heaters, &c., was displayed by the St. Helens Gas Department at the St. Helens Trader's Fair held in the Town Hall, which concluded to-day. The practical side of the undertaking was demonstrated on the balcony, where a miniature gas-works of glass—constructed entirely at the works—showed the full process of gas production.

There are Still a Few Copies of the Transactions of the International Engineering Congress held in Glasgow from June 21 to 24, 1938, for sale. The Transactions contain the text of all the Addresses available for publication together with a complete List of Members of the Congress and the notes on the Works visited. Copies, price 16s., post free, can be obtained on application to the General Secretary, International Engineering Congress, 39, Elmbank Crescent, Glasgow, C. 2, or from the Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1.

Applications for Space in the Gas Section of the 1939 British Industries Fair at Birmingham already exceed the display area available. "We have never been in so good a position at this time of the year," said Mr. W. L. Spinks, Honorary Secretary of the Gas Section at the Fair, Birmingham, in an interview. "The space set apart for the Gas Section is approximately 36,000 sq.ft., and all that, and more, has been applied for. Actual stand area allotted already totals 30,000 sq.ft." The new Organizing Committee for the Gas Section have met and decided to hold the usual Joint Gas Conference during the Fair at Castle Bromwich.

At the Gas Pavilion, Empire Exhibition, Glasgow, Miss Janet Bond, of the Canned Foods Advisory Bureau, London, has been in attendance during the past fortnight, and has demonstrated to large audiences the use of gas in connexion with the heating and preparation of canned products. Since the opening of the Exhibition over 700,000 persons have been present at cookery demonstrations held in the Gas Pavilion. Ten prizes of half-a-guinea each have been awarded to persons returning balloons entered in the recent race organized by the B.C.G.A. and the Glasgow Corporation Gas Department. Balloons were returned from the Orkney Islands in the North to Essex in the South.

An Increase in the Price of Gas is announced by the Newcastle (Staffs.) Town Council, who, on Wednesday last, approved a recommendation by the Gas-Works Management Committee. The increase is 2d. per 1,000 cu.ft., and will be operative during the ensuing half-year. Alderman F. T. Brant (Chairman of the Committee) explained that the increase had become necessary because of the rising cost of coal, which was 3s. per ton more now than three years ago, and because of the increase in the workmen's wages, which had risen twice in the same period. The annual report of the Committee showed an income of £65,976, an increase of £1,199 on the previous year, while expenditure had amounted to £60,114, an increase of £3,791. The gross profit was £5,861, which represented a decrease of £2,593 on the previous year.

A Special Order has been obtained by the Lymm U.D.C. providing for additional lands being scheduled for the manufacture and storage of gas, and other powers in connexion with the Gas Undertaking. Work has begun on the construction of the new vertical retorts. Mr. T. H. West (Engineer and Manager), in his Annual Report, states: "The year has been a good one in face of long periods of bad weather conditions. The quantity of gas provided for the year was 27,987,000 cu.ft., which is an increase of 425,000 cu.ft. over the previous year. The average make of gas per ton of coal carbonized is very little indeed below last year. The quantity of coke and tar produced has again been very good, and realized better prices all through the year, which has helped to meet the increased cost of coal, labour, and general maintenance materials."

Members of The Institution of Gas Engineers will be welcome at an Informal Meeting of the Institution of Mechanical Engineers to be held on Friday, Oct. 14, 1938, at 6.30 p.m., at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W. 1. A Paper will be read by Mr. J. G. Bennett, Director, British Coal Utilization Research Association, on "Coal Utilization Research—Co-operation between Producers, Users, and Appliance Makers." Members of the Institution will also be welcome at a meeting of the Illuminating Engineering Society at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C. 2, on Friday, Oct. 21, 1938, at 7 p.m. A Discussion on Siting of Street Lighting Installations will be opened by Mr. J. G. Christopher, Mr. F. K. Garry, Mr. K. F. Sawyer, and Mr. L. M. Tye. Tickets for this Meeting can be obtained from the Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1.

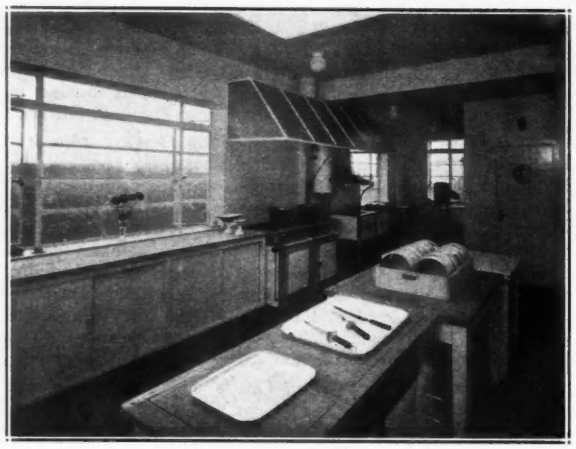
Wales and Monmouthshire Association

New President Elected

Mr. J. Herbert Canning, O.B.E., J.P., Engineer and Manager of the Newport (Mon.) Gas Company, has been unanimously elected President of the Wales and Monmouthshire Association of Gas Engineers and Managers for the year 1938-39.

Gas Equipped Works Canteen

The Wellington Tube Works, Ltd., Great Bridge, have recently completed extensions to the main administrative block of offices at their Works and the extensions include a new canteen for their staff. The accompanying photograph shows a view of the well-appointed kitchens which are fitted out completely with gas cooking and hotplate apparatus.



The canteen itself is remarkably well equipped, being complete with oak sprung dance floor. The Board of Directors are to be complimented on the way in which the welfare of their staff and workpeople is taken care of. Last year the canteens for the workpeople were further extended, and these also are equipped with first-class gas kitchens.

The facilities in the Works also include slipper and shower baths built under part of the main hall of the Sports Club, which includes, apart from refreshment bars and accommodation, four full-size billiard tables, table tennis tables, and card rooms for men, &c., and a special billiard room with other games for boys under 16 years of age.

Midland Junior Gas Association

Birmingham Meeting

At a meeting of the Midland Junior Gas Association held at the Council House, Birmingham, on Thursday, Oct. 6, 1938, Mr. A. W. Attwood, of the Coventry Gas Department, gave his Presidential Address. Prior to the business of the meeting, members stood in silence as a mark of respect to the late A. V. North, of the Dudley, Brierley Hill, and District Gas Company.

The retiring President, Mr. E. T. Pickering, referred to the members of the Association who had been successful in the recent examinations of The Institution of Gas Engineers. In congratulating them, he said it meant a great deal of effort to obtain such results. After the reading of the minutes, Mr. Pickering said that his last duty as President of the Association was a happy one, and that was to welcome Mr. Attwood to the Presidential Chair. Mr. Attwood had a wide experience in the Industry extending over a period of 20 years, during which time he had always been a member of a Junior Association. He had been a member of the Midland Association Council for six years and had the welfare of the Association very much at heart; there was no doubt that under his leadership the Association would enjoy a successful session. He invested Mr. Attwood with the Presidential Medallion.

Mr. Attwood then took the Chair and proposed a vote of thanks to Mr. Pickering. There was no doubt that the Midland Association had benefited and advanced during his year of office. His genial personality and kindness had endeared him to all the members. Mr. Attwood then asked Mr. Pickering to accept a replica of the Presidential Badge. Mr. W. McNaughton (Wolverhampton) seconded the vote of thanks. The vote of thanks was carried with acclamation. Mr. Pickering, in acknowledgment, said he felt certain that the 1938-9 session would be even better than previous ones. What success had been attained during the past session was due largely to the work of the Officers and members of the Council and to the ordinary members for their wholehearted support.

At the conclusion of Mr. Attwood's Presidential Address, a hearty vote of thanks was proposed by Mr. W. N. Smirles (Birmingham) and seconded by Mr. F. A. Pykett (Coventry).

B.C.G.A. General Meeting

London Programme for Oct. 18

Careful consideration has been given to the possibility of continuing the arrangements for holding the Twenty-seventh Annual General Meeting of the B.C.G.A. at Brighton; but owing to the difficulties which would arise, it has been found necessary to make entirely new arrangements, and the meeting will now take place in London on Oct. 18, for one day only.

Mr. A. M. Paddon, M.Inst.C.E., has kindly consented to be nominated as President for a further term, and has again extended a cordial invitation to the Association to hold the Annual Conference in Brighton next year. It is felt that this invitation is one which all members will gladly accept. A change in the usual time of year for the Conference is proposed, and the meeting will probably take place at Brighton at the end of April, 1939. Further information will be circulated in due course.

In the circumstances, Alderman E. Grimsley, J.P., of Leicester, has agreed that his election as President should be deferred until the 28th Annual General Meeting.

Programme of Meeting.

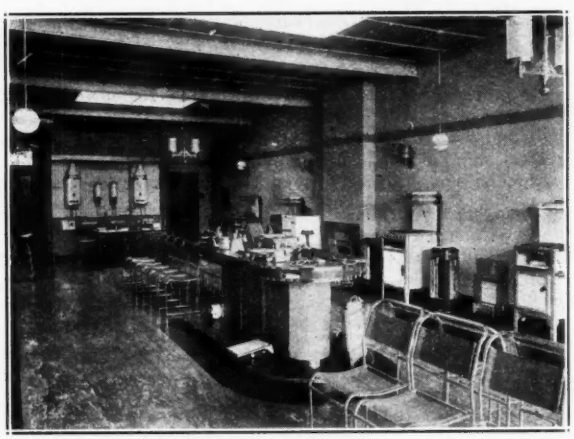
The 27th Annual General Meeting will take place at the Dorchester Hotel, Park Lane, London, W.1, on Tuesday, Oct. 18, 1938. The agenda will be as follows:

10.30 a.m.	Assembly of members and Address of Welcome by the President, Mr. A. M. Paddon, M.Inst.C.E.
	Presentation of 27th Annual Report by the Chairman of the Executive Committee, Mr. W. J. Sandeman, J.P.
	Presentation of Annual Accounts by the Chairman of the Finance Committee, Mr. Stephen Lacey, B.Sc., M.Inst.C.E.
	Première performance of the new season's programme of Gas Industry films.
12.45 for 1. 0 p.m.	Luncheon (by invitation) at which, engagements permitting, the Rt. Hon. Walter E. Elliot, M.C., M.P., Minister of Health, and the Rt. Hon. Herbert Morrison, M.P., will be the Association's principal guests.
2.45 p.m	Private Business Session, to introduce the Association's Smoke Abatement Campaign and to discuss the Association's principal activities.
4.30 p.m. (approx.)	Conclusion of 27th Annual General Meeting.

An exhibition of the Association's work and services will be staged in the Hotel.

The Annual Meeting in London will be supplemented by meetings in the districts which will take place in the near future.

New Showrooms for Chertsey



The accompanying photograph shows the interior of the new showroom of the Chertsey Gas Consumers' Company at Addlestone. Considerable developments have taken place since this Company became associated with the South-Eastern Gas Corporation in June, 1934, in which year the gas manufactured was 145,218,000 cu.ft. The Company closed down its manufacturing plant in 1936 and now takes gas in bulk from the Gas Light and Coke Company, the amount purchased during the past year being 180,291,000 cu.ft. The sales of gas appliances also have increased beyond all expectations. The showroom was designed by Mr. W. J. Parker, F.R.S.A.

Gas Exhibition at Gillingham

The accompanying photograph gives a view of the Rochester, Chatham, and Gillingham Gas Company's stand at the Gillingham Municipal and Kent Industries Exhibition.

THE EXHIBITION ANNOUNCEMENT READS:

New Exhibition, The Park, Gillingham. Wednesday, September 28th, to Saturday, October 8th, inclusive. The greatest Exhibition ever held in Kent. 200 Stands. 2 miles of exhibits. Model gardens, bungalow, etc. Special travel facilities from all parts.

The Exhibition is a temporary building erected specially for the purpose in Gillingham Park and is very roomy and ample in size for a really good Exhibition. The Gas Company have taken an island site 56 ft. by 20 ft. and, in conjunction with Messrs. John Wright & Co., the Davis Gas Stove Company, the Parkinson Stove Company, New Geysers, Ltd., National Gas Water Heater Co., Ltd., Ewart & Son, Ltd., and W. H. Dean & Son, have produced a combined display of gas appliances. A feature of the stand is a by-products display, in which coke is featured together with the various coke appliances.

Another space taken in this Exhibition is a room described as "Mr. Therm's Theatre," in which cookery demonstrations are held and gas films shown.

The Exhibition opened during the crisis period which seriously affected the attendances, and this was immediately followed by two or three days of exceptionally windy and rainy weather. Things are now settling down with attendances improving daily, and it has been decided that the Exhibition shall remain open until Oct. 15.

"Gas Fair" at the North London Exhibition

The Gas Section of the Thirteenth Annual North London Exhibition, which opens to-day, assumes this year an importance not hitherto associated with this well-known autumn function.

Under the style of Gas Fair, the section, which has for some years occupied the East Entrance site, will be transformed from a series of stands occupied by the Tottenham and District Gas Company and certain of the gas appliance manufacturers into a unified and comprehensive gas exhibit, designed by the well-known architect, Mr. Rodney Thomas, to symbolize not only unity and progressiveness of the Gas Industry as a whole, but the greater service which the Industry can render to the public in general.

On entering the Exhibition by the East Entrance the visitor will be welcomed by Mr. Therm, in a suitable setting of light and heat—a glowing example for all he burns to serve. The visitor will be confronted with a spacious layout featuring centrally a pleasant garden, where he can either rest awhile or return for detailed examination of the many attractions which the Fair has to offer.

Beyond, an ascending spiral of gas cookers slowly revolving in a splash of light will focus the attention of all who enter this section. To left and to right displays of all the typical services which Mr. Therm can render will lead the visitor to a closer inspection of the specialized stands provided by the manufacturers. A lake of perpetual hot water surmounted by flowers will symbolize the ease with which gas can cater for every hot water demand. Spanning this lake a structure as modern as the hour will invite the visitor to partake of the most essential adjunct of every Exhibition—a cup of tea—made, of course, with an instantaneous gas water boiler.

From this vantage point an uninterrupted view will be obtained of the stands occupied by all the best-known appliance manufacturers in the Industry. Such names as Ascot, Barker & Turner, Cannon, Dean, Eagle, Ewart, Flavel, Kempton, Main, National, Parkinson, Radiation, SoFono, and Stoves, Ltd., are household words for water heaters, washing machines, irons, radiators, coke grates, and cookers—all specialists offering the finest domestic labour saving appliances. Space does not permit us to enumerate all the features of the 1939 designs to be seen everywhere at the Gas Fair; suffice it to say that all the latest gas appliances are represented.

In addition to the individual stands there is also a selection of all appliances typical of the services gas can render in the modern home, attractively displayed near the main entrances, by the sponsors of this great Gas Fair—the Tottenham and District Gas Company.

Mention must be made of yet another important attraction of this section—the entertainment side—demonstrations of cookery and films.

In addition, Mr. Therm will make his first stage bow in the form of a marionette performance before each film show. The appliance manufacturers are taking it in turn to give the cookery demonstrations. An interesting feature of the general design of the Gas Fair is the break-away from the traditional straight lines in the exhibits. Everywhere curves are used in the panelling and the shape of the stands, greatly enhancing the effect. A muslin "roof" gives an impression of intimacy and hides the not altogether æsthetic aspect of the Palace walls and roof.

"Taking the Showroom to the Consumer"

Successful Policy at Stockton-on-Tees

A very successful sales policy has recently been instituted in Stockton-on-Tees by the Engineer and Manager, Mr. F. L. Scaife. Briefly this can best be described as "taking the showroom to the consumer." It was realized that the main showrooms were convenient only to those consumers having other business in the near vicinity, and that to several thousands of others it was "off the route." It was therefore decided to rent temporary showrooms for a period of a fortnight or more in each of the three outlying districts of the area of supply. Empty shops were rented and with very small expense these were made into suitable temporary showrooms.

Nearly 1,000 visitors were attracted to the displays and the orders received for cookers, washing machines, and other appliances were above expectations. Cooker sales at the main showrooms over the last four months have increased on the corresponding period of last year by over 60%, and of washing machine sales by over 200%.

The Story of Meter and Governor Leathers

A General View of the Diaphragm and General Leather Company's Works.

Members of the British Commercial Gas Association were to have been privileged during the course of the Brighton Conference to visit the Portslade Works of the Diaphragm and General Leather Company, Ltd. We give here an illustrated account of some of the interesting processes they would have seen.

ORIGINALLY, in 1844, the first commercial dry gas meter was fitted with diaphragms made from English sheepskin, the grain side of the skin having been split from the flesh. The grain side was then termed a "Skiver" and tanned in oak bark. These skins, when selected for the gas meter industry would vary in thickness from 0·2 to 0·6 mm., although in those days the true level of the skin, owing to the fact that only strips were cut, was not studied or specified to the degree that is demanded to-day. Bark skiver, when carefully tanned, made excellent leather, but owing to the splitting process, and the fact that the pelt came from a wool-bearing animal, the fibres of the leather were inclined to brittleness.

During the early days of the dry gas meter, the leather trade as an industry did not fully realize the importance of the Gas Industry as an ever-increasing customer, and its requirements were not, in many cases, given the careful attention required.

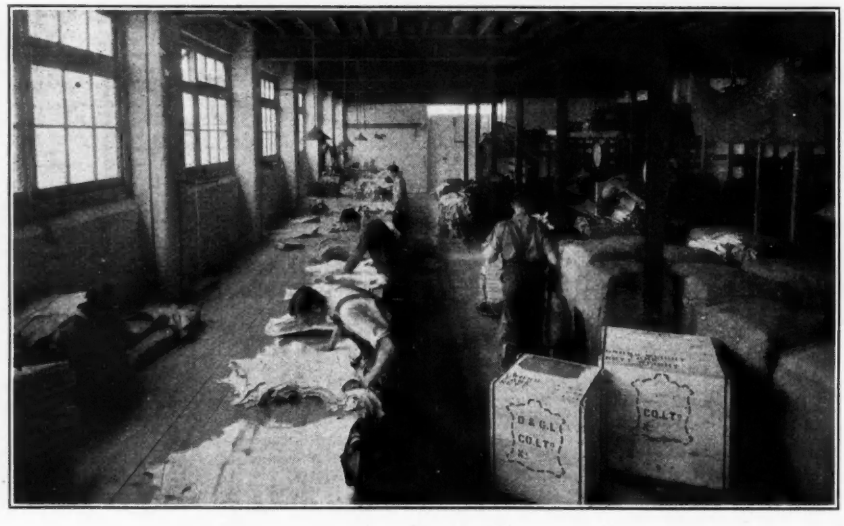
Cornelius Turner, who at that time was concerned only in the dyeing of the best quality light leathers for the binding of Bibles and Prayer Books, was interested in the requirements of the Gas Industry by a friend who was then studying the production of the dry meter. The possibilities of what would later be required for the membranes of a meter were immediately apparent to Cornelius Turner, and although for some years he supplied bark skivers to the Gas Industry, he constantly explored markets, other than those at home, for a better supply. Early in the '50's, when East Indian sheepskins, mixed with goat and calf skins, were being shipped to this country, he introduced the East Indian sheepskin diaphragm. However, it was many years later before this leather was universally approved and adopted in the place of bark skiver, as the supply of bark skivers was in excess of the demand, and had proved entirely satisfactory.

At this time, the load for gas domestically was increasing from lighting to cooking and heating, and meters that had been installed for lighting only were called upon to work at as much as 100% over-load. The skiver diaphragm of these early days was not strong enough for the extra load, but to-day we find meters of the same size case, but bigger gas ways, working at speeds up to 1,000 revolutions, giving an output of more than 100%, without any detriment to present-day diaphragms. Therefore, we now find East Indian Persian sheepskins specified by the Gas Industry both at home and abroad.

The sheep from which the skin is obtained is a hair-bearing sheep, very lean and agile. The pelts are first tanned around Madras with a vegetable material, and this tanning, with modifications, was used in this country for many years. About 1918, it was found that this form of tanning was not suitable for many districts. There were many reasons for this, but the chief one was the alteration in the method of gas manufacture. A few of the large gas undertakings had been studying the leather problem, and they issued a specification for the semi-chrome tanning of skins. Roughly this demanded that the finished dry leather should not contain less than 2½% chromic oxide, that the leather should be neutral, be able to withstand immersion in boiling water for 15 minutes without shrinking, and should remain soft and pliable when dry. Therefore to-day we find that approximately 70% of the leathers used in the world's Gas Industry are tanned by the semi-chrome process.

Manufacturing Processes.

THE leathers arrive from India in what is termed the crust state. They are then carefully inspected by skilled sorters, first, with a view to eliminating all skins that are unsuitable for the requirements of the Gas Industry. The suitable skins are next graded as near as possible to the final thicknesses required,



Sorting Shop.

so as to avoid undue stressing of the skin through over-shaving. The shaving process is dealt with later. The imperfect skins are then dyed and finished suitable for the gloving industry.

A measuring machine of the latest approved pin-wheel pattern records on a dial the accurate total area of the skin either in decimetres or square feet according to the customer's requirements.

Tanning Drums.

AFTER the skins have been measured they pass to the tanning drums where the semi-chrome tanning process is carried out. The leather is first washed and stripped with a suitable alkali to remove some of the original native tanning. The necessary quantity of chrome solution is then run in through the hollow axle of the drum, and followed at a later period with a fat liquoring process. When the leather contains 2·5% chromic oxide and satisfactorily withstands the boiling test, it is transferred to another drum containing water and borax for the neutralizing process. Finally the leather is again well washed to remove any surplus salts resulting from neutralizing.

Tanning Drums.

Striking Out.

THE skins are next struck out. This process is a mechanical one, and its object is to remove the wrinkles and creases caused by the revolving tanning drums, and leave a smooth surface skin. After this the leather passes to the drying sheds.

Shaving and Fluffing.

FROM the drying shed the skins go to the shaving and fluffing shop. The operation of shaving consists of the reduction of the leather by slicing, or paring away, either side of the skin in such a manner that the leather is of a uniform thickness throughout.

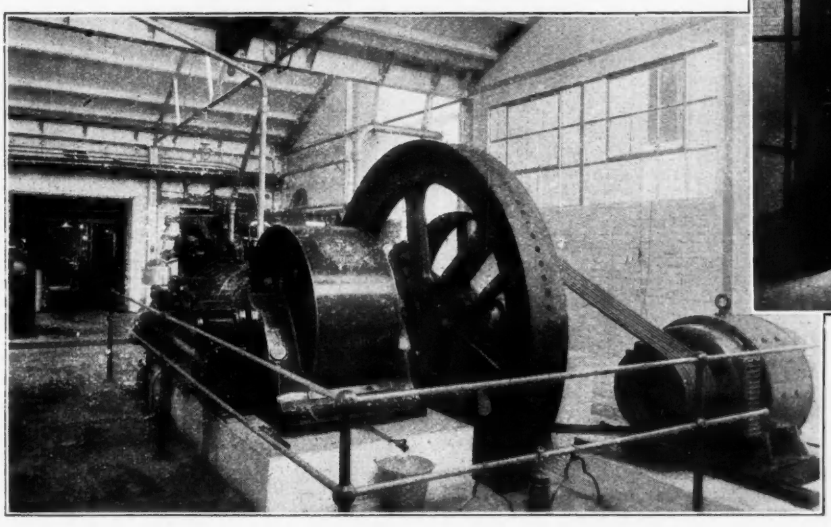
The chief components of a shaving machine are two cylinders, one the cutter and the other the feeder. The feeding cylinder is fitted to an adjustable and movable arm, which enables it to be set so as to shave the skins to the final thickness required. The skin is then fed into the machine and the feeding cylinder held the correct distance from the cutter by means of the operator's foot. This is a highly skilled operation, as any over pressure on the feeding cylinder would result in the skin being cut through, thus rendering it entirely unsuitable for governor and meter diaphragms.

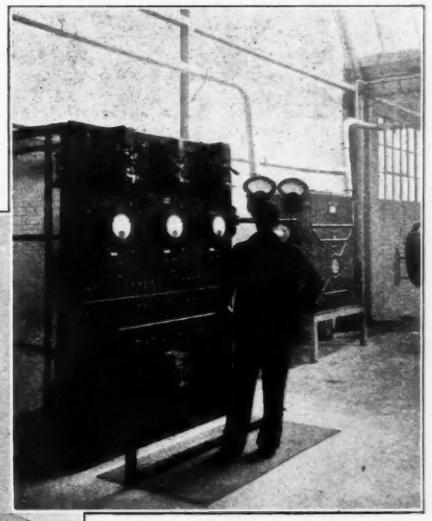
The skins then go on to the fluffing machine, where they are passed over an emery wheel which gives them a fine nap. This materially assists in holding the oil dressing which is later applied to the leather.

Cutting-Out

FOR gas meter leathers it is essential that only the best parts of the skin are used. The flanks should not be cut into, as this part is of a more "stretchy" nature than the centre of the skin. This operation is still done by hand, and the men are highly skilled in all branches of the work. According to the requirements of the particular country, all shapes and sizes of diaphragms are cut—circular, square, and rectangular. In the case of very large meters, it is sometimes necessary to cut the diaphragms from semi-chrome tanned calf or cow hides. Finally, before the goods are dispatched, all diaphragms are carefully tested over powerful lights.

The whole of the electric current for power, lighting, &c., throughout the works is generated by three engines of a total of 280 h.p. working on town gas, of which they consume approximately 10 million cu.ft. per annum when working on average load.

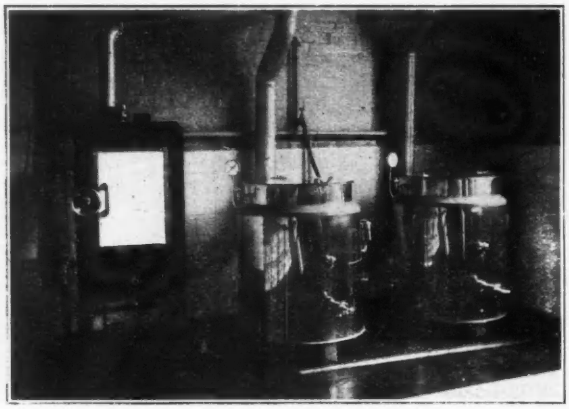




Above—Control Board; and *left*, the Engine Room, where gas provides the power.

All-Gas Kitchen Provides Meals for 6,000 Children

Our photograph shows some of the gas equipment recently installed by the Newton-in-Makerfield Gas Department at the new Earlestown Co-operative Society's kitchen. This kitchen has recently been built to provide meals for about 6,000 necessitous children in that district. The scheme is controlled by the County Council, and in collaboration with the local Co-operative Society all-gas equipment was decided upon.



The illustration shows a thermostatically controlled "Benham" steamer for cooking potatoes in batches of 200 lb. at a time; it is also used for cooking steamed puddings, &c. The boilers are 45 gallon capacity "Alcalda" pattern, gas-fired thermostatically controlled, working at 4 lb. pressure and are used for cooking vegetables, stews, custards, and boiled meats. All the pans and casings are of stainless steel.

The Co-operative Society have expressed their satisfaction with the whole plant which is now working with speed and precision.

London and Counties Coke Salesmen's Circle

The Fourteenth Ordinary Meeting of the London and Counties Coke Salesmen's Circle was held at Gas Industry House on Wednesday, Oct. 5—Mr. J. GRAYSTON (the Chairman of the Circle) presiding.

The HON. SECRETARY (Mr. F. A. Haddock) read the notice convening the meeting, and the minutes of the Twelfth and Thirteenth Ordinary Meetings were taken as read and approved.

The CHAIRMAN called attention to the forthcoming Business Meeting of the Circle on Dec. 14, at which it was customary to elect officers and members of Council for the ensuing year. The Hon. Secretary was now in a position to receive nominations, and he urged memoers to send them in without delay. He also reminded members that the Question Box was still in existence if they wished to take adavantage of it. Another item of interest to the Circle was the preparation of a "Coke Salesman's Manual," the principle and preparation of which had now received the approval of the Technical and Executive Committees of the L.C.C.A. Finally, the Chairman referred to the L.C.C.A. approved list of coke-burning appliances which was now complete and in being. It was the intention of the Association to circulate this to all member undertakings in the form of a library and/or office copy—a smaller and more portable edition would also be available.

Mr. F. J. LAWS, of the Tottenham and District Gas Company, then read a Paper entitled "Some Aspects of the Sales and Servicing of Coke Grates," which we hope to deal with in a subsequent issue of the "JOURNAL."

Natural Gas in Scotland

During the past few weeks further production tests have been carried out on a well drilled by the Anglo-American Oil Company at Dalkeith. Four sands from 2,000 ft. to 2,152 ft. gave a combined natural gas production of 5 million cu.ft. per day, with a shut-in pressure of 700 lb. per sq.in.

The establishment of the presence of natural gas under high pressure in some of the sands is stated to be an encouraging factor.

Crucible Swelling Test for Coal

New British Standard Specification

A further step in the standardization of methods of analysis of coal and coke has been taken by the publication of B.S. 804-1938—Methods for the Crucible Swelling Test for Coal.

The crucible swelling test is based on the method devised in the laboratories of the Woodall-Duckham Companies, the resulting button being compared with standard outlines. It has been found possible, by standardizing conditions of test, to obtain reasonable concordance in the results. Full details of the method of test are given, together with a chart of the standard profiles and the corresponding swelling numbers, and details of the development of the method are included in an appendix.

Copies of this British Standard, No. 804-1938, can be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W. 1, price 2s. 2d. post free.

Flues for Gas Appliances

The British Commercial Gas Association has performed a very useful service in publishing a book dealing with flues for gas appliances. The work, which should prove helpful to builders and architects, is fully illustrated by clear line diagrams showing the correct method of installation where the outlet is above the ridge, on an external wall, in the roof space, and where the roof is flat. Downdraft, bafflers, connexions to flues, flue requirements and sizes, and the question of condensation are treated, and considerable space is devoted to special gas flues—precast concrete flue blocks—their construction and their cost in comparison with the normal coal fire flue. The cost of gas flues it is shown—and the figures were furnished by an independent quantity surveyor—can be less than half that of coal fire flues. The reduction in brickwork made possible by the use of gas flues may, of course, lead to very large economies not only in structural costs but in the superficial floor area available.

Another Prize-Winning Display

This entry by the Bideford Gas and Coke Company was successful in winning first prize in the Trades Section of the recent Bideford Hospital Carnival.

"Modern Living"

If we hadn't been told we would have been completely "taken-in." *Modern Living* is the name of the attractive quarterly "magazine" which is now before us, and looking at its cover, warm with colour and full of feminine appeal, we cannot bring ourselves to believe that it has anything to do with the latest publicity efforts of the London group of gas undertakings. Such it is, however, and it is going to be very well received by the millions of consumers in and around the Metropolis.

Publicity *per se* has been strictly avoided; rather have the Gas Light and Coke Company, who are responsible for its publication, concentrated on the services and comfort gas is able to provide. These are within the reach of all—thanks to "half-price" gas. Among the attractively illustrated articles are "Beauty Treatment for Fireplaces" by Grace Lovat Fraser, F.I.B.D., "You Wouldn't Boil Your Baby" by Sister Cooper, S.R.N., "Storing Food for 1,000 Meals" by Eileen Murphy, "A New Fashion in Fires" by Mrs. Guy Martin, and "Casserole Cookery."

North of England Gas Managers' Association

Autumn Meeting at Sunderland

The North of England Gas Managers' Association held their Autumn Meeting at the Palatine Hotel, Sunderland, on Friday, when the PRESIDENT, Mr. Charles Dru Drury, a Director of the Sunderland Gas Company, presided over a large gathering.

At the outset, the PRESIDENT referred to the death of Mr. Robert Gray, late Chief Engineer of the Newcastle-upon-Tyne and Gateshead Gas Company. Mr. Gray was appointed Chief Engineer at Newcastle in February last, and was shortly afterwards elected a member of the Association. His death came with tragic suddenness in June at a meeting of The Institution of Gas Engineers. He was 41—in the prime of life. It was not given to many of them to make his acquaintance, but those who had realized his capabilities and the worth of his character. He had his feet on the upper rungs of the ladder of his career.

The President continued with a reference to the death of Dr. Charles Carpenter last month. He had been associated with Dr. Carpenter in the early days of his own career for some eleven years, first at the Vauxhall Works and later as his Assistant. He was not an easy man with whom to work; his staff had to carry things out in his particular way, but he always recognized honest work. Dr. Carpenter was definitely an individualist. He went his own way and worked out his own ideas. He was reserved almost to shyness but, socially, he was a delightful companion and had more than a passing knowledge of music and painting. As a gas engineer and administrator Dr. Carpenter was outstanding and would long be remembered for his association in the establishment of the thermal basis as a unit for the charge of gas.

The President then congratulated student members of the Association in their success in the Examinations of The Institution of Gas Engineers. They would find their study well worth while as a co-ordination of theory and their practical work.

New Members.

New members were elected to the Association as follows:

Transfers from Associate to Full Membership.—Messrs. B. Richardson (Newcastle) and F. L. Scaife (Stockton). *Associate Members.*—Messrs. W. Blakeley (Darlington), J. R. Clark (Elswick), W. Clark (Middlesbrough), W. S. Clark (Hartlepool), J. Gordon (Fencehouses), W. R. Loriner (Alnwick), N. P. Nelson (Hartlepool), R. H. O'Neil (Alnwick), and T. W. Perks (Stockton).

Presidential Address.

The PRESIDENT then gave his Address, which will be found elsewhere in this issue. On the conclusion of the Address,

Mr. T. LAW (Malton), the Vice-President, proposed a vote of thanks to Mr. Drury for his Address. He said he had listened to it with very great interest. When the President mentioned the year 1880, he was afraid he did not know anything of that time, as it was a few years before he was born. When he entered the Gas Industry, the works at which he started had changed from lime to oxide purification, but he had heard so much about the frequent changes with that method of purification and the trouble in disposing of "blue billy," as the spent lime was called, that he was pleased the change had taken place before his initiation to the Industry. One must agree with the President that it was most irksome and unfair that the Industry should be so shackled as compared with the electricity industry. It was a pity that the powers-that-be had not made more noise about those restrictions, as they might have got some removed, for it was a truism that those who made the most noise generally got the most attention. It was very satisfactory to read that the National Gas Council had a representation of 95% of the gas produced, and he hoped the Council would not be satisfied until the 100% figure was reached. Probably the 5% only represented very small undertakings, and it might be that by circularizing them some would come in. He was certain that a circular on the matter could not do any harm, and it might do much good.

One could re-echo the President's reference to the National Joint Industrial Council, and he could bear testimony to the fairness with which the organizers of the employees had met him personally when conditions had had to be considered, and he had met one or more during the last six months. He agreed most emphatically with the President's remarks on sulphur, for it would be a good thing for the Industry if gas could be supplied both sulphur and ammonia free, as those elements were the chief cause of the deposits on gas burners. He was afraid that he could not endorse the President's remarks on complete gasification, but he believed that was probably due to the fact that he personally had no trouble in selling coke. If he had, his views would probably alter. He agreed with the remarks regarding governors, for he was a firm believer that the chief essentials in gas selling were to keep both the pressure and the quality of gas supplied to the apparatus constant. With regard to industrial gas, and he included central heating in that category, he believed there was a great future for it providing they could supply at a price to compete with the other fuels. His idea was that the price would not have to be more than 4d. or 5d. per therm. With reference to methods of charge, that was a very debatable subject, but he could not see any reason for altering the value of the therm, for whether it was 4,000 or 100,000 B.Th.U., economics would decide which fuel a householder would use. There was only one thing he could say about coal, and that was that it was too dear, and the big increase in the last three years should be taken off with the least possible delay.

Mr. HERBERT LEES (Hexham) said he was perhaps the only one present who could recall Mr. Drury's election to the Association in 1892. He remembered when their President came from the South Metropolitan Gas Company, and the young men of the Association of those days were anxious to see for themselves what sort of men that Undertaking turned out. That was on April 30, 1892—the centenary of the discovery of coal gas for lighting purposes. Within six years, Mr. Drury had made such an impression on the Association that on the same day, April 30, he was elected President. On that occasion, Mr. Drury gave a Presidential Address of outstanding merit, and he had had the privilege of seconding a vote of thanks. In the forty years since then, Mr. Drury's influence in the affairs of the Association had been an important one. They knew Mr. Drury's capacity as an engineer and organizer, and they all recognized his sterling character.

The vote was carried with acclamation and the PRESIDENT briefly replied. That concluded the meeting, and the members adjourned for lunch in the hotel.

Luncheon.

At the subsequent luncheon, Mr. T. R. SEWELL, Vice-Chairman of the Sunderland Gas Company, presided and, proposing the toast of the "Gas Industry," said that gas undertakings in Britain must recognize that it was the challenge of their rival, electricity, which had served to stimulate their Industry and awaken it into new life and enterprise in recent years. In Sunderland, the Gas Undertaking was going through a period of change. Two-thirds of their supply was now coke oven gas, and he thought the change would be beneficial both to the Undertaking and to its consumers. Britain's greatest mineral wealth was its coal resources, and no effort must be spared to make use of coal in the most economical way while giving the consumers the cheapest supply pos-

sible. That, he contended, was what the Gas Industry was doing to-day.

Mr. DRU DRURY replied to the toast.

A vote of thanks to the Directors of the Sunderland Gas Company was accorded on the motion of Mr. W. M. GALLEWAY (Whitby).

VISIT TO A TURNER & NEWALL WORKS.

After luncheon, the members assembled in large numbers at the Works of the Washington Chemical Company, Ltd.—an important manufacturing unit of Messrs. Turner & Newall, Ltd., whose ramifications are world wide. The Washington Works are of particular interest to the Gas Industry as being the Head Office of Newalls Insulation Company, whose products find so many uses where heat economy is called for. For almost half-a-century the Company have specialized not only in the manufacture and sale of insulating materials, but also in their application, and with their own staffs of skilled craftsmen they are able to tender for and carry out any contract calling for their use.

The material known as 85% Magnesia Heat Insulation is a simple component of two constituents—*i.e.*, not less than 85% by weight of pure hydrated carbonate of magnesia, the balance being made up of long strand pure asbestos fibre. The former material is of a complex nature which can be expressed (for the benefit of the student or technician) by the chemical formula:

$$3MgCO_3\ Mg(OH)_2\ 4H_2O,$$

and it was the process of manufacturing this which the members first saw at the Washington Works.

Magnesia carbonate is manufactured from a natural rock, known as dolomite, which is obtained locally from the Company's own extensive quarry near Hylton, on the River Wear. On arrival at the factory, this rock is calcined in kilns, the magnesia carbonate in hydrated form being thereafter "collected" or separated from the remaining constituents by the utilization of carbon dioxide. A special process is followed in the final stages, whereby the "liquor" of hydrated magnesia carbonate is converted into a light, pure white crystalline powder of exceeding fineness. The crystals, although so small, are not of regular form, such as cubes or prisms, but when examined under a microscope are seen to be of a very delicate, attenuated, and complex structure.

Minute Sealed Air Pockets.

The interlocking of millions of these crystals in each cubic inch of the finished insulation entraps an infinite number of dead air spaces, each having a miscroscopic volume. It is the presence of these sealed air pockets forming a very large proportion of the total volume which makes the finished product so highly efficient in the reduction of heat transmission.

The asbestos fibre content of 85% magnesia is solely a binding medium. Although not so efficient as the basic material, the asbestos fibre possesses very considerable non-conducting properties and completely justifies its inclusion by binding the magnesia carbonate into a light but rigid mass having ample strength when dried out after application in plastic form or when moulded into slabs or sections. Extensive experimental work readily demonstrated the addition of 15% asbestos fibre, thoroughly teased and uniformly distributed throughout the mixture, to be quite ample for this purpose, giving the most satisfactory results in the necessary compromise between strength and durability on the one hand, and maximum thermal efficiency with low initial cost on the other.

This long strand asbestos fibre—a complex mineral largely composed of silicate of magnesium, is of the finest quality procurable. It is quarried from several extensive mines controlled by the Turner & Newall, Ltd., organization in the Union of South Africa, these mines producing the highest grade and purest raw asbestos obtainable throughout the world. Before it is ready to be mixed with the magnesia carbonate, the rock asbestos is subjected to many processes, of which the final operation consists of separating the teased fibre so as to occupy as large a volume as possible. In this form it is carefully blended with the magnesia carbonate in the proportion stated.

Great interest was shown by the visitors in the finishing processes by which the insulating material is made to assume the various forms and shapes demanded by commerce, and a comprehensive exhibit of Turner & Newall products included many other items familiar to the gas engineer. Among others may be mentioned "Everite" asbestos cement pipes for gas mains, the well-known Everite flue pipes and fittings, insulating backs for gas-fires, and insulating bricks of different shapes and grades.

New Insulating Brick Works.

After inspecting the Works, members were entertained at tea, when they were welcomed by Mr. G. STIRLING NEWALL, D.L., J.P., Managing Director of Messrs. Turner & Newall, Ltd.

In welcoming the members, he recalled the link which his firm had had with the Gas Industry, in that up to comparatively recent times they had themselves produced gas. However, negotiations with the Sunderland Gas Company had resulted in the latter taking over their Works to their mutual satisfaction, he hoped.

The factory they had inspected that day, said Mr. Newall, was only one of many owned by his Company. It was, however, a very important chemical and insulation unit. To show the ramifications of the firm, he mentioned that they had asbestos mines as widespread as in South Africa, Rhodesia, and Canada. They had two plants working in India and one more was in course of erection. In all he supposed they employed fourteen to fifteen thousand hands.

Continuing, Mr. Newall informed the meeting that they were putting down a new insulating brick works at Washington, adjoining the factory they had just inspected. He would mention that although they were in the heart of the coalfields, only gas and electricity would be used in the new unit. The whole of the heating was to be done by gas, which, he was certain, would be good news for the company assembled.

In connexion with the new works, they wanted the help of the Gas Industry. He was certain that the article to be produced should be useful to that Industry when it was ready; he only asked that when the time came they would give it a fair trial.

Athletic and Social

Watford Co-Partnership and Pension Funds.

The annual meeting of co-partners of the Watford and St. Albans Gas Company was held at the Company's fine new offices, Radiant House, Watford, on Sept. 29. The Committee, in presenting the Twenty-ninth Annual Statement of Accounts and Balance-Sheet of the Company's Co-Partnership Fund for the year ended June 30, 1938, together with those in respect of the Pension Fund (1928), the Life Assurance Scheme, and the Group Life and Pension Scheme for the same period, state that the memberships of the Schemes at June 30 were as follows: Co-Partnership Fund, 689; Pension Fund (1928), 448; Life Assurance Scheme, 88; Group Life and Pension Scheme, 197. The voluntary contributions to the Co-Partnership Fund of £1,547 show an increase of £55 over last year's figures. Since the inception of the Fund, £1,259 "A" Stock, £26,362 Ordinary Stock, £3,735 5½% Preference Stock, and £990 5% Preference Stock have been allocated to Co-Partners. The Pension Fund (1928) shows an increase of £12,115 over last year, making the Total Accumulated Fund to date £79,448. 37 Pensioners received their pension either wholly or in part from the Fund, while 21 received pension entirely from the Company.

The Committee congratulated the Company's employees on the splendid collections made by them to the various local Institutions: Watford Peace Memorial Hospital, £97 4s. 6d.; St. Albans and Mid Herts. Hospital (including Nursing Association), £97 16s. 2d.; West Herts. Hospital, £40 13s. 3d.; St. Dunstan's, £4 19s. 1d.; Hospital Savings Association, £17 9s. 10d.; making a total of £258 2s. 10d. This year has seen the introduction of a scheme whereby all employees can have their contributions to the above-mentioned hospitals deducted by weekly amounts from their wages. This new arrangement has met with general approval, as is shown by the fact that 412 employees now have their contributions deducted from their wages.

Gloucester Profit Sharing and Saving Scheme.

Presiding at the thirteenth annual meeting of the Gloucester Gas Light Company's Profit Sharing and Saving Scheme on Sept. 28, Mr. J. H. Jones, Chairman of the Committee of Management, mentioned that there had been difficulties between the Gas Company and the Corporation, but the position had improved, and the Gas Company were about to carry out some improved lighting in the City. "Our scheme," said the Chairman, "has received a bit of a knock this year by the fact that the price of gas has gone up, and therefore the bonus has gone down from 5½% to 3½%."

With regard to the report and statement of accounts, Mr. Jones said the number of members was 269, as compared with 249 last year. The report was seconded by Mr. T. Seaman, and unanimously carried. The bonus due to 269 members was £1,348.

The Chairman announced the re-election of the retiring members of the Committee appointed by the Directors, Messrs. J. Morgan Matthews and W. E. Tew. Messrs. A. Field and A. Hurcombe (representing the employees) were re-elected. The meeting elected another employee, Mr. T. Seaman (from the works), in place of the late Mr. W. H. Ford. A silent tribute was observed to the memory of Mr. Ford.

Mr. F. W. Rogers mentioned the decrease in bonus percentage to 3½%. "It is up to you to bring the sales up so that we return once more to 5½%," he said.

Mr. J. Morgan Matthews thanked Mr. Jones and the Secretary, Mr. C. I. Poyner, on behalf of the members. The vote of thanks was carried with acclamation.

French Gas Industry

Review of the 61st Congress of the Union Syndicale de l'Industrie Technique du Gaz en France

The 61st Congress of the Union Syndicale de l'Industrie Technique du Gaz en France was held at Saint-Malo between June 14 and 18, M. Louis Stoss, the President, being in the Chair.

Prizes of 5,000 francs were awarded to MM. Arnaudeau and Combet and to MM. Delarozière and Duhamel jointly for the papers presented by them at the 1937 Congress while MM. Duchêne and Quéret de Sacy received awards of 3,000 francs each.

Our review of the Papers and Reports discussed at the Congress commences below.

RECENT PROGRESS IN THE USE OF MOTOR GAS IN CENTRAL EUROPE.

In May, 1938, a party of engineers attached to the Paris and surburban Gas Companies toured Central Europe with a view to studying recent progress in the use of gas as motor fuel. A report on the visit was presented by P. Schereschewsky.

In connexion with the interest attaching to the use of alternative motor fuels in France, it is pointed out that, in virtue of a decree promulgated in August, 1937, each owner of more than ten lorries is obliged to equip at least one of them with a producer, or, as an alternative, with fittings enabling bottled gas to be used.

In greater Germany, approximately 50 towns have, by now, been provided with gas filling stations. The capacity of the compressors generally ranges between 3,500 and 7,000 cu.ft per hour, though at Vienna a machine having a capacity of 8,400 cu.ft. per hour is at work, and one rated at 21,000 cu.ft. per hour is under construction for Berlin. It will be driven by a 270 h.p. gas engine.

Czechoslovakia possesses a dozen filling stations, the compressors of which have capacities of 2,100 or 4,200 cu.ft. per hour. The majority were installed during the past two years.

Compressors are generally belt-driven with electric motors as the motive power. In Czechoslovakia, the smaller machines are direct coupled, the larger machines being driven by way of reducing gears. However, at Troppau, one of the small compressors has, for some months, been run from a single-cylinder gas engine.

Working pressures are normally 5,000 pounds/square inch. The highest pressure so far employed at a gas filling-station is at Vienna, where a pressure of 5,700 pounds/square inch has been employed for the past two years without trouble. These pressures are higher than have hitherto been customary in France, though the situation will shortly be altered. The operation of a filling-station and the use of compressors running at a pressure of 5,000 pounds per square inch are to be regarded as presenting no extraordinary features and to be within the normal scope of the activities of a gas undertaking of even moderate capacity.

There has been a very rapid increase in the past two years in the number of lorries driven by gas, namely, from 887 vehicles in Germany on July 1, 1936, to 6,969 on July 1, 1937. The number is still increasing. The quantity of gas consumed per annum has reached 230 million cu.ft., of which approximately 35 million cu.ft. represents sewage gas. An increase to 25,000 vehicles with an annual consumption of 12,500 million cu.ft. per annum is contemplated.

Particulars of developments in individual towns are given in the accompanying table.

The majority of the lorries are owned by the municipalities, though private consumers are not disdained. It is due to the help of the municipal authorities that the Governments concerned have been able to show such large developments in the short space of two years.

The storage reservoirs of filling-stations are often charged to a higher pressure than in France, *e.g.*, to 3,200 pounds/square inch in Czechoslovakia and Austria. Their water capacity is, also, frequently larger, namely, 2·8 to 3·5 cu.ft. In Czechoslovakia, it is reckoned that the vehicle cylinders may account for about 10% of the useful load of a lorry, the radius of action being 75 miles.

At Stuttgart, an exceptional means of filling the cylinders was adopted since the Municipality was anxious to equip a fleet of vehicles in the minimum of time. The cylinders are dismountable and are conveyed each day to the filling-station, which is somewhat far from the depôt. In view of the fact that sewage gas is employed, it was, for the time being, impracticable to erect the filling-station near to the depôt. However, a second filling-station has been ordered. The repeated dismounting and replacement of the cylinders has not been accompanied by any drawbacks.

Town.	Date.	Vehicles.	Gas Consumption, Millions of Cu.Ft. per Annum.	Remarks.
Germany:				
Hanover ..	1937*	130	30	The number of vehicles rose from 15 to 100 in 12 months.
Stuttgart ..	1938	135	32	An increase to 200 vehicles is expected, merely for municipal purposes. A second filling-station has been ordered.
Heilbronn ..	1938	14	3½†	Three additional vehicles are to be equipped.
Vienna ..	1938	25	17½	Road sweeping and sprinkling vehicles are also to be fitted for gas. The vehicles at present in use are refuse-collecting lorries.
Berlin ..	1937	23‡	53	The high gas consumption per 'bus is noteworthy and demonstrates the importance of gas for this particular use.
Czechoslovakia:				
Vitkovice ..	1938	25	—	—
Prague ..	—	—	—	A second filling-station, for municipal motor 'buses, has been ordered.
Troppau ..	1938	5	—	A small town with an annual gas make of only 90 million cu.ft.

* December. † Sewage gas. ‡ 'Buses.

Reducing valves are always of the two-stage type. In this connexion, a peculiar construction was noted in Czechoslovakia, where, due to the severity of the climate, the reducing valve is adjusted to give a minimum pressure of $\frac{4}{10}$ in. w.g., even when the engine is shut off. The existence of this leak facilitates starting up but necessitates an additional valve between the reducing valve and the mixing chamber. This valve can be manipulated by the driver from his seat.

Engines require no alterations to enable gas to be used. The normal carburettor, the petrol tank, and the original compression ratio are retained, even though the latter involves some sacrifice of efficiency. On the other hand, flexibility is thereby retained, and, if a large radius of action is necessary, a quick change-over to petrol is possible when the gas supply has been exhausted. Furthermore, this flexibility obviates the need for spare equipment at the filling stations. Should a compressor be out of action, the nearest petrol pump fills the gap. However, the compressors are built on sound lines and recourse to a petrol pump is but rarely necessary.

Filling is a speedy operation and is always by way of reservoirs of ample size and not direct from the compressor. The distribution terminals are operated readily and rapidly and may be entrusted to semi-skilled labour. A single lever controls all the necessary manœuvres, including the discharge of the filling hose into a low-pressure gas main. The terminals resemble petrol filling-stations very closely in appearance and are just as easily operated. At Vienna, a fleet of 5-ton lorries was charged at the rate of 4 minutes per vehicle.

Motor gas must not be regarded as a competitor of motor spirit, even in totalitarian countries, since demands for motor fuel are increasing so rapidly.

THE USE OF THE MICROSCOPE IN THE STUDY OF TAR.

The pioneer work of Nellensteyn and of Lacau and Léauté has been extended by L. G. Sabrou and M. Renaudie, who advocate the use of the microscope in the study of tar. Their Paper is illustrated with 37 photomicrographs.

The problem of securing the necessary thin film of tar in absence of distortion effects produced by pressure has been solved by the use, between the slide and the cover-glass, of fine strands of Pyrex glass silk having a diameter of 5 microns. The microscope employed was fitted with an attachment capable of taking 4·5 × 6 cm. photographic plates. Preferably, the photographs should be taken in a dark room since the dark slides can then be used without their shutters. If shutters are used, their withdrawal may disturb the focusing. A point source of light, *e.g.*, a car-lighting lamp, should be employed. With

orthochromatic plates—panchromatic plates are unsuitable—the exposure may range from a few seconds to 45 seconds. A long exposure is undesirable since the specimen may be affected by heat from the lamp.

A magnification of 250 diameters is satisfactory and provides a depth of focus somewhat smaller than 5 microns. An oil-immersion lens gives a depth of focus of the order of 1 micron and only particles smaller in size than this are rendered quite sharply.

Reference was made to filled tars and particularly to the patented use of spent oxide which has a polymerizing effect in virtue of its content of free sulphur and gives rise to a large increase in viscosity.

Among instances in which the microscope has given useful indications may be mentioned the case of a road tar which had been found to exhibit poor adherence. The tar had a thixotropic behaviour, though chemical analysis revealed nothing abnormal. Abundant crystals of anthracene were, however, revealed by the microscope. The process of distillation was suitably modified to enable the trouble to be overcome.

STUDY OF DEVICES FOR THE EVACUATION OF WASTE GAS.

A Paper by E. Biard was devoted to the use of draught interceptors and static aspirators in conjunction with gas appliances and particularly in connexion with central-heating systems. Draught interceptors are especially useful in that they help to prevent condensation in virtue of the depression of the dew-point of the waste gas caused by the air drawn in by their agency. When properly designed, they virtually render the performance of gas appliances independent of the actual chimney draught. They may, if need be, be rendered fool-proof in operation by safety devices which may be of two forms, one providing absolute safety and shutting off the gas completely and permanently as soon as the chimney ceases to function normally, the other affording partial safety and reducing the gas consumption of the appliance during the period of faulty working of the chimney. Suitable devices, made by Etablissements Théobald, and embodying a pilot flame and bimetallic spring control in the interceptor, were described.

In connexion with the use of draught interceptors, the terminals are often fitted with static aspirators to enable down-draught effects due to wind pressure to be overcome. The theory of their action was explained and particular stress was laid on the need for a suitable location. The distance of the device from the wall is particularly important since, on it depends the draught created by a wind of given velocity. Indeed, if the aspirator is too near the wall, a static pressure is developed.

The effective aperture must be greater than the cross-sectional area of the flue-pipe. Suitable forms of aspirators designed by the Société d'Eclairage, Chauffage et Force Motrice were described.

Static aspirators have the further advantage that they enable short flues to be employed.

(To be continued.)

New Books

Two Useful Works Reviewed

Gas Analysis*

Gas analysis plays such an important part in fuel problems that a small volume sufficing to meet everyday needs is assured of a ready welcome. The present book is intended for the use of students taking laboratory courses in fuel technology, but it should also serve them in good stead in their subsequent careers.

The construction and manipulation of five well-known and commonly employed types of gas analysis apparatus are described —namely, those associated with the names of Bunte, Orsat, Buckley and Sinnatt, Bone and Wheeler, and Haldane. By way of amplification, useful sections are included on the cleaning of mercury, the sampling of gases, the preparation of the various absorbents, combustion methods, and, what is of great importance, the correct relationships to be maintained between the volumes of residual gas and air in the explosion stage of the analysis.

A very full account of the Masterman and Dunning method for the estimation of carbon monoxide in combustion products is given at the end of this section.

A further chapter deals with the determination of sulphur compounds, benzole vapour, naphthalene vapour, ammonia, cyanogen, tar fog, and nitric oxide. Where full details are not given, the reader is referred to the original literature on the subject.

Finally, the determination of calorific value by the Junkers, Boys, and Union calorimeters is described.

The author has chosen his material very judiciously and has been at pains to remove the pitfalls which lurk in the way of the beginner. In some cases, however, the wording is not as lucid as it might be nor is the style all that might be expected.

Within the compass of a short review it is not possible to carry out the author's request for information as to all the errors in the book. It may be pointed out, however, that gas could not be introduced into a sampling-tube designed in accordance with fig. 5 and that, in fig. 8, the mercury levels and tap positions are such that atmospheric pressure and a considerable suction exist simultaneously in the gas burette. On p. 37, phosphorus pentoxide is termed phosphorous pentoxide. The heading at the top of p. 31 contains the mysterious word "aanlysis" and, in the example dealing with the calculation of the results of an analysis in a Bone-Wheeler apparatus, C_nH_{2n+2} is given as $C_{1\cdot25}H_{4\cdot5}$ whereas the correct formula is $C_{1\cdot17}H_{4\cdot34}$.

The following sentence on p. 45 may be quoted as an example of phraseology capable of improvement. "The absorption of the nitrogen dioxide produced will appear to be carbon dioxide and be assumed to be methane." Many other instances could be given. One may wonder, also, what authority exists for the use of the word "meniscusses" (p. 60).

In the diagram (fig. 19) of the Bone-Wheeler apparatus a tap "P" appears, but no reference to it is made in the text.

It may be suggested that the author might find it useful to enlist the aid of some of his more advanced pupils in the detection of further errors and faults. He would thereby be assured that they have read the book intelligently and he would, at an early date, be in a position to bring out a revised edition of what will prove a very useful manual.

* Gas Analysis, by A. McCulloch. [London, 1938. H. F. & G. Witherby. Pp. 166, 38 illustrations. Price 7s. 6d.]

Coke*

Coke comes into its own with the appearance of a monograph in which the subject is treated as a problem in the upgrading of fuel. The present volume will rank as a worthy successor to Simmersbach's classic "Grundlagen der Kokschemie."

The authors' conception of coke is a wide one and embraces the fully or partially carbonized residues from wood, peat, brown coal, bituminous coal, and pitch. Sections dealing with the manufacturing industries concerned have been entrusted to well-known authorities in their respective spheres among whom may be mentioned F. L. Kühlwein and A. Jenkner (metallurgical coke) and H. Ch. Gerdes (the Gas Industry).

The utilization of coke is discussed, also by specialists, from the aspects of direct combustion, gasification in stationary and mobile producers, and in water-gas generators and application in chemical processes. The co-ordinated use of fuels in the power-station, particularly in relation to the meeting of peak loads, is another theme to which full consideration is given. The concluding sections of the book deal with economic questions and with the organization of coke sales in Germany.

Obviously, the intention was not to provide a detailed and comprehensive description of the various processes of manufacture and utilization but, rather, to present broad principles with a sufficiency of specialized information to render them intelligible. On the other hand, the omission of unnecessary detail has enabled a wide variety of topics to be dealt with in the available space. An up-to-date bibliography extending to nearly 600 references directs the reader to the sources of such additional information as he may require for his own purposes. The monograph is well illustrated and includes 106 diagrams.

* Koks. Ein Problem der Brennstoffveredlung. By H. Kurz and F. Schuster. Vol. 17 of the Monographs "Chemie und Technik der Gegenwart." [Leipzig, 1938. S. Hirzel. Pp. xvi. + 382. Price RM. 21.40 bound, RM. 20.00 unbound.]

THE NORTH OF ENGLAND

GAS MANAGERS' ASSOCIATION

Presidential Address

OF

CHARLES DRU DRURY, M.Inst.C.E.

Presented at the Autumn Meeting of the Association held at Sunderland on Friday, Oct. 7.

THE PRESIDENT.

It is just forty years ago since I occupied the position which I hold to-day, and I esteem it a great compliment and an assurance of your confidence that you have once more elected me President of this Association, for which I reiterate the thanks I expressed at our last Meeting.

Not only have you conferred this honour upon me, but you further placed me in your debt last May by electing me an Honorary Member of the Association, a position which I occupy with much gratification in the company of three distinguished members.

My immediate predecessor in the Chair reminded you that it is the privilege of old age to be reminiscent, and the temptation to be so on this occasion is so great that I must venture to inflict on you some of my early recollections of the Gas Industry.

My connexion with it began so far back as December, 1880, when I became a pupil of the Engineer of one of the Gas-Works in London.

Those were the days of direct-fired retorts with hand labour for stoking, the use of cannel coal for enrichment of the gas, of lime purification and illuminating power. Heats of retorts were comparatively low and makes of 9,000 to 10,000 cu.ft. of gas per ton of coal were considered satisfactory results.

It was at this period that the competition with electricity began and electricity was being tried out for street lighting. The Victoria Embankment in London was an instance with, I think, "Jablokoff candle" lamps giving a violet light with much spluttering and hissing. Interior electric lighting with incandescent lamps was in its infancy and very expensive. Where in use at all it was, I believe, with current generated on the premises. I have memories of visiting the Gas and Electric Exhibition at the Crystal Palace in 1882 where installations of both arc and carbon filament lamps were being displayed.

About 1885 direct firing of retorts gave way to generator and regenerator furnaces—the Klönne system from Germany being more or less the model on which the new system developed—and the possibilities of stoking machinery began to be recognized. There had previously been several attempts to mechanize retort house operations, but it was not until John West brought out his drawing and charging machinery that it was realized such plant could be a commercial and economic success. His machines were chiefly worked by compressed air, but I have seen instances where they were driven by an endless rope or from a square shaft running the length of the retort house. Foulis also produced machines but actuated by hydraulic power. Later the De Brouwer projector was introduced into this country from Belgium. This machine had the great advantage that in charging no portion of it entered the hot retort, and together with the telescopic pusher for discharging the coke there resulted the further advantage that the machinery could be introduced into existing retort houses where the space on either side of the retort bench was too narrow for other forms of mechanical stoking.

The first move away from horizontal retorts, which up to that time had been practically general throughout the country, were the inclined retorts brought into practical use by M. Coze, of Rheims, about the year 1885 and set at an angle of 30° or more from the horizontal. At one time this type of retort seemed likely to oust the horizontal owing to the saving in labour effected and to the fact that no stoking machinery was necessary. But there was so much difficulty in obtaining coals to suit the angle of the retorts during the period of carbonization that the field for coal was very much restricted, and although several large installations of "inclines" were erected in various parts of the country and were worked with a considerable amount of success, they dropped out of favour.

Having succeeded in disturbing the repose of horizontal retorts, the next move was to make them vertical. Vertical gas retorts as an economic proposition had been largely adopted in some of the German gas-works, emanating in the first instance from Dessau, and these were of the intermittent type. They were first introduced into this country in 1910 when an installation was erected in Sunderland where it is still capable of doing good work.

In the meantime British brains had been concentrating in this direction and had succeeded in producing a continuous, as opposed to an intermittent, vertical retort, and to-day finds a very large number of such vertical installations, both continuous and intermittent, in use with retorts of varying sections, up to that of chambers.

History repeats itself and there is nothing new under the sun, since a reference to "King's Treatise on Gas" published in 1878 gives illustrations of both inclined and vertical retorts dating about 1804 or 1805.

The supplementary manufacture of blue water gas or carburetted water gas in gas-works became increasingly popular, the plant being used as desired to produce a diluent for a rich coal gas, or as a means (when carburetted) of coping with winter and peak loads, as standby plant, or for the regulation of stocks of coke.

The method of the purification of gas was almost entirely by means of slaked lime, but when in 1905 the sulphur restrictions on the London and other gas undertakings were removed, and the limit of 20 grains of sulphur compounds other than sulphuretted hydrogen per 100 cu.ft. of gas no longer obtained, purification by oxide of iron became general.

Lime purification although very effective was relatively expensive, and the removal and disposal of the spent lime was a source of worry and nuisance.

Towards the end of last century a chemist named Cooper introduced his "liming process" by which he claimed that

the combination of coal with soda lime would convert the nitrogen of the coal and coke into ammonia, and would also improve the quality of the tar and of the gas and coke produced. I remember this process being given a trial at the works to which I was attached—2½% of slaked lime being mixed with the coal prior to carbonization; but the results were so contradictory that the process sank into oblivion.

Purifiers were mostly constructed with water sealed covers; but I recollect some fifty years ago having the opportunity of inspecting, at one of the works of the Commercial Gas Company, London, a set of concrete purifiers with plated covers made gas-tight with rubber joints. These purifiers, I believe, had been in use for many years.

Gas lighting was almost entirely effected by means of the flat flame burner which with 16 c.p. gas gave a duty of about 2½ candles per cu.ft. and required only 5/10ths of an inch pressure. Slightly better results were obtained from the Argand burner with the glass chimney, and better still from regenerative burners such as the "Siemens" and the "Wenham." At the 1882 Exhibition I have a vivid recollection of the demonstration of the "Lewis" gas burner in which a bunsen flame produced with an artificial air blast impinged on a cone of fine platinum wire resulting in a dazzling light. The practical difficulty was the rapid reduction in the efficiency of the platinum wire owing to the detrimental action on it of the sulphur compounds in the products of combustion of the gas, and little more was heard of the burner. A brilliant light with small consumption was obtained from the "Albo-carbon" burner, which some of us may remember as a flat flame burner with a globular container above it through which the gas passed and into which were inserted from time to time small sticks of naphthalene which the heat from the burner vaporized, giving enrichment to the gas.

It was in 1885 that the revolution in gas lighting took place with the introduction into this country of the Welsbach mantle, first in its upright and later in its inverted form. Efforts were made subsequently to effect the catalytic lighting of the gas by means of a pellet of spongy platinum woven into the fabric of the mantle, but as in the case of the "Lewis" burner the poisoning effects on the platinum of the sulphur in the gas were such that the process met with little success.

Later Developments.

Having indulged at considerable length in reminiscences I now turn to later developments.

The Gas Industry has been termed a "regulated monopoly," but the monopoly at the present day merely represents the confinement of the activities of each gas undertaking to its own scheduled area of supply, and the Industry is open to keenest competition, the principal source, of course, being that from electricity. Gas is still bound by many legislative fetters from which electricity is comparatively free, and although they have been somewhat relaxed of late years, remain irksome and unfair restrictions on our Industry. The comfortable suggestion that there is "room for both" always annoys me for, although no doubt true, our electric rivals are doing, and will continue to do, their utmost to restrict the room for gas to the attic. Since the cost of generation forms so small a portion of the total cost, it is difficult to visualize the price of current becoming much cheaper than at present; but there is no doubt that electric undertakings will make every effort to improve the efficiencies of their processes and apparatus, and generally endeavour to render the use of electricity more and more attractive to the public.

Oil, another keen competitor, is practically free from restrictions and under certain conditions can show very economical results. When considering the use of oil for heating and power, however, prospective users should take into account the facts that the country is very largely dependent for the supply of oil on our colonies and on foreign countries, that the world's supply is not inexhaustible, and that prices may fluctuate according to conditions and emergencies to any unanticipated extent.

Pulverized coal as a heating agent is also a force to be reckoned with.

In the face of such competition it acts as a good tonic should one be needed to take stock of the magnitude of our Industry and of its astonishing growth.

Board of Trade Return Relating to all Authorized Gas Undertakings in Great Britain for Year 1936.

Total gas made, including C.W.G. and C.O.G.	334,049 million cu.ft.
Total gas sold	309,936 " "
Number of consumers	10,775,444
Miles of mains	61,593
Coke oven gas purchased included in above	24,329 million cu.ft.
Coals carbonized	18,334,000 tons
Coke for water gas	545,000 "
Oil	32,507,000 gallons
Aggregate issued capital by Companies, including premiums and all borrowed money by Local Authorities	£225,849,568

Comparing these figures with those of 1921, the earliest comparable statement that I can find, shows an increase during the past 15 years in the sale of gas of 35½%, in the number of consumers of 42½%, and in the miles of main of 55%. Not bad progress for an Industry some 130 years old!

National Organizations.

We are, I am sure all will agree, fortunate in our National Organizations, which with their very efficient officers have served the Industry well, and it is gratifying to note that the National Gas Council now has a representation of 95% of the gas production of the United Kingdom. That 100% may soon be reached is a result highly to be desired, for as it has been said "we must all hang together or we shall hang separately."

The last decade has seen the formation of the British Gas Federation which enables the Industry when required to speak with one voice, also the Women's Gas Council which promoted in 1935 now boasts 48 branches with over 9,000 members.

I should like to make special reference to the National Joint Industrial Council, forming a section of the Federation of Gas Employers, and bear my testimony from personal experience to the useful work that it has been able to carry out. The discussions round the table between the employers' and the workers' representatives have been all to the good, and under the statesmanlike and tactful chairmanship of Sir David Milne-Watson matters of contention between the two sides, which have sometimes threatened serious developments, have been overcome and peacefully arranged. Decisions have not necessarily always pleased one side or the other or both, but it is said "when neither side is satisfied justice has been done."

Apart from internal labour difficulties and problems the Gas Industry has satisfactorily weathered storms arising from other sources; as, for instance, that of coal stoppages. In 1892 there was such a stoppage which lasted nearly three months but was confined to the Durham pits. In 1912 there was a national stoppage of six weeks, and again in 1921 another of three months; but the last in 1926 was the greatest strain on the Industry, for in spite of early prophecies that it would soon terminate, it actually lasted nearly seven months. Coal stocks at practically all gas-works were exhausted and recourse in most cases had to be made to supplies from the Continent and America. However, except in the case of possibly the smallest undertakings, the supply of gas to the public, although involving great additional cost to the gas undertakings, never failed.

Education.

One of the important features of late years has been the founding in 1923 of the Education Scheme of The Institution of Gas Engineers.

The spirit of the Scheme is "satisfactory education," and it is founded on a broader basis than the mere capacity to answer questions. It provides no short cuts to advancement but in issuing certificates there is the assurance that the successful student has pursued and profited by an adequate course of study under qualified direction and tuition in a properly equipped educational establishment or laboratory.

From the regulations it should be obvious to a student that it is a great advantage to him to have matriculated before leaving school, matriculation or its equivalent being one of the qualifications for admission to the Diploma examinations.

Since the Institution received its Charter, admission as a corporate member is dependent on the candidate having secured certain certificates, but the Scheme as last amended leaves a way open for anyone, whatever his position in the Industry, to obtain a Higher Grade certificate which will not,

however, render admission to The Institution of Gas Engineers any easier, as the candidate for election must still qualify by showing that he has received proper training and the necessary experience, and that he holds a suitable position in the Industry.

This year 488 candidates sat for the examination as against 60 in the first year of the Scheme. In addition 2,074 candidates sat for their Gas Fitting certificates at the City and Guilds of London examination.

It is greatly to be hoped that seniors in the profession will make it as easy as possible for the juniors of their staffs to avail themselves of the Education Scheme, and to endeavour to obtain from their Boards of Directors or Gas Committees financial and other assistance for them.

The great advantage to those juniors who can afford the expense to take the three years' course of study at Leeds University and obtain their Degree is manifest. The Industry requires the best brains possible, and although degrees and certificates do not necessarily make successful men, such training, combined with practical work and experience, should produce the men that are wanted. Here, however, as a word of caution I would quote the adage "What we learn after we think we know, is all that counts."

Attendance at classes or the taking up of a University course entails sacrifice, both of time and money, on the part of the individual, but nothing that is really easy is worth having and the value of such certificates and degrees is being increasingly recognized in the profession.

The establishment in 1932 of the "North of England Gas Managers' Association and Arthur Clement Hovey Educational Trust Fund," the nucleus of which was the generous gift of our member, A. C. Hovey, exists to give such of our members, whom the Trustees of the Fund may consider desirable, financial assistance in carrying on their studies.

Architectural Improvements.

The Gas Regulation Act of 1920 gave considerable impetus to the Industry due to greater freedom allowed, and consequently methods of production were afforded greater scope. One result was a large increase in the number of installations of vertical retorts and of gas chambers, both of the continuous and intermittent types, in all of which steaming could be employed, and makes of gas were reached in the region of 18,000 cu.ft. with a yield of some 80 therms per ton, and with a marked reduction in carbonizing costs.

With the advent of vertical retorts the design of retort houses has been considerably changed and solid and substantial brick buildings have largely given way to light steel structures with brick or reinforced concrete panelling, forming shells clothing the retort bench. Although in some cases these structures are very plain in appearance they can at small additional expense be made to fall in with the character of the district in which they are erected, and I recently have seen illustrations where they have been made to do so very effectively. In one popular Yorkshire holiday resort the retort house is actually considered an addition to the amenities of the town; in another the structure might not unreasonably be taken to represent an Ecclesiastical building; and in a third it bears resemblance to a Scottish Castle.

Although in my opinion excessive elaboration and ornamentation of structures in gas-works are from many points of view undesirable, yet the preservation of the amenities of the district is well worth considering even at some additional outlay.

At one time it was the fashion to adorn ridges of roofs and tops of structures in gas-works with ornamental cast iron cresting, and also to attach rosettes to the junction of the diagonal bars of lattice girders of gasholders, &c. Such cases of ornamentation have given me in my time moments of anxiety and I have had to spend considerable amounts of money and time in removing them, especially the rosettes mentioned, the danger from which would announce itself when one or more portions would fall off, due to rust forming in inaccessible places, to the danger of life and the risk of damage to the structure concerned. I noticed in *The Times* a couple of months ago the statement that the Tower Bridge over the Thames, which it will be remembered is a definitely ornamental structure, was to be closed for a fortnight for certain repairs, and for the removal of certain ornamental ironwork from the upper footbridges which was forming a hindrance, as it did not permit the painter's brush to penetrate to parts which it was considered essential to paint for the purpose of preservation.

In purifier design the water-seal for covers has given way to the rubber joint, and though cast iron is generally preferred for the boxes themselves, in many cases they are being constructed of reinforced concrete. I have, however, seen boxes being made from steel plates welded throughout, but I believe that purifiers of this type are so far mostly confined to by-product and chemical works.

A Difficult Task.

The Gas Engineer of to-day has in many ways a more difficult task than was the case 30 or 40 years ago. Then works plant was more or less stereotyped, but now the scope is much greater, adding to his responsibilities when making a choice and involving his serious consideration. Shall he adopt horizontal retorts with stoking machinery, or continuous or intermittent verticals, or chamber ovens? Shall his choice for handling his hot coke be the conveyor, the telpher, the "Le Fleuve," or such a process as the "Sulzer"?

Station meters need cause him little thought, but he has the alternatives to the large wet meter of the "Connersville," of the "B.M.," and of several inferential meters, all of which have their good points.

When he comes to consider the gasholder he finds alternatives to the frame-guided type in the spiral-guided and the waterless holders. All these again have their merits and choice will largely depend on circumstances—capacity of holder to be erected, nature of ground and space available, facility for increasing the capacity in the future, and pressure of gas required at the outlet. Further, there are the pressure holders, either spherical or cylindrical, but these perhaps are more suitable for outlying districts where they may be used for boosting during the hours of heavy demand.

In distribution he can choose between cast-iron pipes, steel tubes (solid drawn or welded) and spun-iron pipes, together with a variety of joints—the caulked, the welded (in the case of steel), and the many types of flexible joints—his final decision depending on local conditions and requirements.

Removal of Sulphur Compounds.

Little alteration has taken place in the method of the purification of gas. At one time there were high hopes of liquid purification, but beyond that obtained in the washers and scrubbers such a process has not materialized in this country; in fact, it is difficult to see what room there is for it considering the cost of dry purification is so small an item in that of manufacture. Nevertheless, in the direction of the reduction of the sulphur compounds other than sulphuretted hydrogen there is still much left to be desired. The catalytic process employed by the South Metropolitan Gas Company has certainly shown that the reduction can be accomplished, but the working of the plant appears to be a matter requiring great care and entailing considerable expense. On the other hand, the extraction of benzole by means of washing with oil, or by the use of activated carbon, very materially reduces the sulphur.

The presence of sulphur in purified gas, though innocuous, certainly has disadvantages for the consumer and also has a bad effect on catalysts used for igniting gas. It is therefore incumbent on the Industry to bring about its further reduction as speedily as possible.

Naphthalene, the trouble from which was at one time one of the greatest bugbears of the Gas Engineer both in the works and in the district, has now been simply overcome by the process of washing it out of the gas with oil, a comparatively small quantity of oil only being required, and the process is suitable for works of all sizes.

The partial drying of gas with the object of reducing its dew point below that of the lowest temperature at which it is supplied is a step in the right direction, and has the definite advantages of preventing the formation of rust in mains and services, and of reducing the labour of pumping syphons.

A process has been adopted at Hameln, in Germany, for the detoxification of coal gas thus rendering it non-poisonous. It is based on the catalytic oxidation of the carbon monoxide by steaming the gas while at a temperature in the neighbourhood of 800° F., and as a result it is claimed that the carbon monoxide content can be reduced to below 1%, that the sul-

phur compounds are reduced, and that there is an increase in the production of coke, tar, and benzole, with no increase in the cost of manufacture. I believe these results have yet to be proved on the average working basis.

As a selling point for gas its detoxification may be an advantage, but as a prevention of suicides it is doubtful whether gas so treated would cause any great reduction in their number, since to place oneself in an atmosphere of non-poisonous gas will bring about death sooner or later.

With regard to accidental deaths from coal gas poisoning, a report of the Board of Trade for 1930 shows that on the whole the number was relatively small, less than a quarter of those due either to drowning or falling down stairs, a figure which the Commission considered gave no cause for alarm.

It is somewhat disconcerting to find that, in attempts to improve the quality of gas, processes employed are apt to involve us in other difficulties and create new problems to be solved. For instance, the extraction of naphthalene has in some cases been followed by the appearance of a small quantity of sulphuretted hydrogen in the gas at the outlet of the holder, from which impurity it was perfectly free when entering. Research shows the apparent cause is that naphthalene in the tank water acts as a bactericide, and with its removal the bacterial production of sulphuretted hydrogen takes place. Means for dealing with this trouble may be found by the chemical treatment of the water in the tank.

Then again, trouble arising from gum formation in apparatus in the works and in the district has made itself felt or become intensified during the past few years. Research in the matter has revealed that this gum in the first instance is due to the presence of small quantities of nitric oxide in the gas and is formed in the gasholder, but that gum particles settle out at a greatly increased rate if the moisture in the gas is condensing. Most of the nitric oxide is due to the presence of waste furnace gases brought about by over-pulling at the retorts and the remedy to this extent is obvious. It is also clear that if gas-drying plant is installed it should be placed at the outlet of the holder.

Complete Gasification.

For some time past I have believed, and I am not alone in that belief, that in the complete gasification of coal lies the future of the Gas Industry. The production at gas-works of both gaseous and solid fuels, to some extent competing with one another, is an anomaly. I cannot think that the use of high-temperature coke will ever become really popular for open domestic fires. In comparison with coal, coke is bulkier to house and handle, produces more ash and requires more constant attention, so that no saving in labour results, although it is true that coke fires started by gas show a definite advance on those lit with paper and wood. Moreover, competition in the coke market is an increasing one. Low-temperature coke, though relatively expensive, has definite attractions and the supply of prepared domestic coke from coke ovens is being increasingly pushed and has come to stay.

The efforts of gas undertakings to provide suitably designed grates for burning coke, and the inducements held out to customers to install them, are, of course, commendable, but can one say after such apparatus is installed that "gas coke" will always be the fuel used, or that customers will not be attracted by offers of other makes of coke and give up the use of gas coke entirely? In pushing the sale and use of gas apparatus, however, gas undertakings can feel sure that the only fuel that will be used in them is town gas.

To the extent that the public is educated to the advantages and saving in labour afforded in the "all-gas house" so the use of solid fuel of any sort will correspondingly decrease. Given a progressive tariff the cost of fuel in the "all-gas house" need be no more, or very little more, than that of solid fuel. Where in excess, that excess is generally found to be more than counterbalanced by the great saving in labour, the convenience of gas, and the absence of dirt arising from its use.

Complete gasification as now carried out labours under the disadvantage, unless carburetted, of producing a gas of comparatively low calorific value, approximately 340 B.Th.U., and of being of greater specific gravity than straight coal gas, so that its production is not altogether an attractive proposition except where circumstances are favourable; but there are evidences that a revolution in the complete gasification of coal may be brought about by means of a process by which carbonization will be carried on under high pressure, and in the presence of streams of oxygen and steam.

E. V. Evans in his notable Paper read at the Meeting of The Institution of Gas Engineers last June on "The Processing of Coal" envisaged the possibility of such a new process as a result of the investigations carried out by a Joint Panel of the Research Committee of The Institution of Gas Engineers and Leeds University with the Fuel Research Board. He stated there was nothing improbable in the prospect of obtaining a yield from one ton of coal of 160 to 180 therms of gas having a calorific value of 500 to 560 B.Th.U., together with about 27 gallons of tar not dissimilar to low-temperature tar, and also such quantity of hydrogen under pressure as would be required for the hydrogenation of that tar to motor spirit. In such a plant the use of non-caking and low-volatile coals would be available, thus increasing the field from which to draw supplies and conserving the resources of gas coal.

Sampling of Coal and Coke.

Not before their time have the collieries taken steps by washing or by dry separation to reduce the amount of stone and ash in the coal they supply, and the Gas Industry has obviously benefited by their action in several directions, not the least being the improved quality of the coke produced from the better quality coal. The Industry in its turn has applied itself to the cleaning and grading of its coke.

The regular testing of raw materials and by-products is essential to good working results, but a great deal of time may be wasted unless the material to be tested is properly sampled.

Sampling coal from railway wagons is a difficult and illusory matter, especially where coal is filled direct into the wagons from the cleaning plant at the colliery. My practice for many years past has been to sample one complete wagon load, out of so many received in the run, at the elevator head after the coal has passed through the breaker, using a hand scoop of known capacity. The gross sample collected in this way, and representing a definite percentage of the whole, is reduced by mechanical means and the analysis carried out according to the British Standards Specification. My results so far as the ash content was concerned have been occasionally challenged by the particular colliery concerned, but when invited to inspect the method adopted its representative has always failed to suggest a better system.

The sampling of coke again is not simple and I adopted the system, in the case of broken coke, of periodically, and for a whole day, taking a shovelful from every vehicle before passing over the weighbridge, placing the samples in a bin with a tightly fitting lid until the next day when the analysis was made. Incidentally it was found that the moisture in the broken coke, which averaged 3% over the period of a year, was distinctly lower than that in the unbroken coke.

Domestic and Space Heating.

The modern gas fire is a tremendous advance on the original type with asbestos clay balls packed in an ordinary grate or with upright fireclay slabs in which were fixed slotted vertical rows of asbestos fibre. These have long since been consigned to oblivion, and the fire of to-day is of artistic design and colouring fitted with a self lighter, ready on tap to radiate heat, with the health-giving infra-red rays.

I should, however, be glad to see the practice much extended of fixing fires with concealed gas supplies, as I consider the appearance of the most attractive fire suffers when the brass pipe is visible along one side of the fireplace. It would also add to the popularity of the gas fire if where possible the controlling tap were more often fixed at such a height as would obviate stooping when lighting.

For space heating of churches and halls (especially where down-draughts are met with), workshops, and offices, the overhead radiant heaters appear to be admirably suited, and I anticipate considerable extension of the system.

It is superfluous for me to point out that in gas fires, as, of course, in all gas using apparatus, it is most essential from an efficiency point of view to maintain a regular pressure at the point of ignition, but I fear that such practice is far from being general. I should like to think that the day is not far distant when every service, and better still every separate gas apparatus, will have its governor attached and the pressure

of gas in the mains maintained to such extent as will enable the governors to function at all times.

Industrial Gas.

Town gas has been employed in many forms for industrial processes for some time past. Prior to, and during the Great War, it was much used for processes associated with the metallurgical, textile, and associated industries. Since the war, however, its application to the requirements of industry in general has been very considerably widened, and as manufacturing methods have improved, so the need for a more carefully controlled fuel has arisen.

It will be appreciated that the production methods of today are such that manufacturers and others requiring heat in one form or another call for it in a form which is technically in keeping with the high standard which they have adopted throughout their industries as a whole. In this respect gas has played a very substantial part.

The greater freedom enjoyed by the Gas Industry of recent years in the formation of tariffs has led to the opening up of vast possibilities in the industrial gas load. These are by no means limited to any particular sphere in industry, but it is obvious that the potentialities are greater in the areas devoted to the heavy industries. In recent years gas has been recognized as one of the most convenient, most controllable, and most certain sources of fuel supply, with the result that the uses to which it is now put exceed those which up to a few years ago were regarded as the potential limits of the industrial gas field.

In the iron and steel industry, to mention only one, gas is now used in enormous quantities, and its adaptabilities to the requirements of that industry have ensured its ever-growing future. The Gas Industry has considerably enhanced its reputation as a progressive one by the thought which it has given to modern requirements, and the research carried out by many of the larger gas undertakings has led to a wider conception of the value of gas than has ever before existed. It is now by no means uncommon to discover entire works and factories dependent entirely upon town gas for processes requiring heat.

Engineering works, glass works, and the like taking gas in excess of 250 million cu.ft. per annum are by no means uncommon and, with the wide range of attractive tariffs now offered, the majority of gas undertakings are in a position to attract, in one form or another, such industries as are found within their areas of supply.

Gas for Vehicle Propulsion.

Town gas as a substitute for petrol for driving motor vehicles was largely brought into use during the war, in many cases by the simple expedient of attaching to the vehicles overhead bags containing 200 cu.ft. or more of gas at atmospheric pressure and making the necessary adjustments to the carburetters. It was found that about 250 cu.ft. of 500 C.V. gas was equivalent to one gallon of petrol. Naturally the range of travel of vehicles so equipped was very limited and later on recourse was made to gas compressed into steel cylinders fixed to the chassis.

At one time it was hoped that this means of propulsion would be considerably extended, especially in connexion with the heavier types of vehicles, but unfortunately, owing largely to the weight of the cylinders to be carried, the cost of installing compressing plant at suitable centres and to the competition of the Diesel oil engine, this hope has not been realized, although in Germany I understand considerable progress has been made in this direction, where conditions are different to ours owing to the fact that brown coal is available in that country.

A competing scheme of providing vehicles with producer gas generators is a development which may have possibilities at present unforeseen.

The interest of gas undertakings in transport appears to lie in the production of motor spirit through the extraction of crude benzole from the gas. During the war pressure was put by the Government on the Gas Industry to produce as much oil from coal as possible for the manufacture of explosives, and the Industry responded with extraordinarily good results. The extraction of crude benzole where the process was carried out resulted in obtaining an average of 2¼ gallons of crude benzole per ton of coal carbonized.

After the close of the war many undertakings discontinued the process as being uneconomical or inconvenient, but under the provisions of the Gas Undertakings Act, 1920, which materially helped the running of it, the process was largely revived. The matter has now received further prominence by the issue in the spring of this year of the report of Lord Falmouth's Committee. The Committee desires to encourage gas undertakings (of which only 47% on a coal tonnage basis recovered benzole in 1936) to greater efforts in this direction. In that year, the report mentions, 51 million gallons of motor oil were produced in gas-works and coke ovens, a quantity which, however, represented only 4% of the total requirements of the country, and adds that if it were possible for all gas-works to bring up their extraction of light oils to the coke oven standard of 3 gallons per ton of coal, a further 20 million gallons of motor spirit could be obtained, but that this figure would, on the basis of the present scale of activities in the two industries, probably represent the limit of production from these sources.

The report points out that it is evident, so long as the price of imported fuel oil remains in the neighbourhood of its present figure, the case for home produced oil, judged by purely economic standards, falls to the ground and therefore recommends that the preference of 8d. per gallon (now 9d.) on home produced spirit should be maintained for a further period of twelve years.

The report, of course, deals with other methods of producing oil from coal, such as the hydrogenation process as being carried out at Billingham, the synthetic process as exemplified by the "Fischer" system, and low-temperature carbonization, or any other process found to be commercially successful, all of which would very largely increase the home production.

Low-temperature carbonization, however, does not make that headway which its supporters would probably wish. At the present time I believe there are 15 such installations in this country and there is some increase in the demand for the smokeless fuel obtained; but its relatively high price as compared with that of high-temperature coke does not permit its sale to make great progress.

While on the subject of oil from coal it interests me to remember that some 35 years ago I took the opportunity, while in the neighbourhood, of visiting Heathfield, in Sussex, where when boring operations for water were being carried out on the premises of the then L.B. & S.C. Railway Company a flow of natural gas of high illuminating power had been discovered. The flow was small but the Company took the opportunity of piping it into a small holder in the Station Yard and lighting the Station premises with this gas. The practice, I believe, was discontinued four years ago and the gas so obtained is now compressed into steel cylinders and despatched to the Midlands for research work in connexion with mines.

Boring for oil in the district referred to and in Hampshire and Dorset has, I understand, for some time past been taking place, but the results have been disappointing. Hopes, however, have been revived with boring in Midlothian where quite lately results have proved partially successful, and it is anticipated that petroleum supplies in good quantities may be obtained from this source. Boring is also now taking place in the North Riding of Yorkshire.

Methods of Charge.

In the earliest days of gas, the charge was based largely on the numbers of burners and hours in use; this method gave way to a charge per 1,000 cu.ft. through the meter, the charge being almost invariably a flat one. In 1894 the slot meter was introduced which gave great encouragement to small consumers as thereby they were enabled to "pay as they went" instead of waiting for the quarterly accounts.

The present century, however, has seen the basis of charge changed from cubic feet to that of "therms," due to the inventive genius of the late Dr. Charles Carpenter, and which by the Gas Undertakings Act of 1920 was, except for the very smallest gas undertakings, made compulsory. Under the therm system the charge is for heat actually supplied, and thanks to "Mr. Therm" the public should now be fully aware of its advantage.

In the opinion of some members of the profession, the therm representing 100,000 B.Th.U. was too large a unit and

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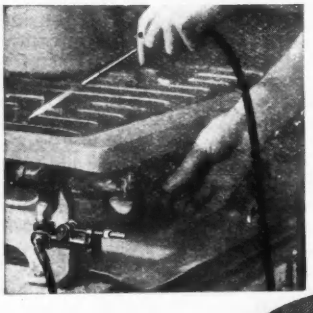

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The variety of SUSSEX Cookers—there are now seven models with alternative hotplates—and the choice of finishes available offers gas undertakings a splendid scope for increased sales. Literature describing the SUSSEX Series can be had on request.

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to enable the price of gas to compare on easy terms with that of electricity it was suggested that a "Gas Unit" of 3,412 B.Th.U. as in the case of the "Electric Unit" should be adopted. As this figure represents the gross heating value of gas and takes no account of efficiencies, it was held in many quarters that a unit of 4,000 B.Th.U., 1/25 of a therm, would be preferable, and although the National Gas Council gave no ruling in the matter they recommended that if a gas unit were to be used it should be that of 4,000 B.Th.U. Although this gas unit has been adopted by one of the large London gas undertakings and by several others in the country, and also by some of the gas apparatus manufacturing firms, it has not so far as I know become popular and to my mind is undesirable. Gas cannot legally be sold on anything but the therm basis although the recording of it must be done in terms of cubic feet. To introduce a third basis of charging can, I think, only confuse the public. Moreover, a unit of 4,000 B.Th.U. has no scientific foundation and is purely arbitrary.

On the subject of tariffs I have no intention of enlarging, since the matter has been so fully and ably dealt with by others more competent than myself. I would merely remark that we must all of us be conscious of the fact that the "flat rate" is decadent and that progressive tariffs must be arranged if business is to be attracted.

Coal Legislation.

The Coal Mines Act of 1930 included, among other matters, provisions with regard to the production, supply, and sale of coal. The schemes have progressed and the position now is that the coal trade has monopolistic powers in regard to what it may charge for its commodity. In some schemes it is laid down that it is the duty of the Executive Board to sell coal to the "best advantage" and this without reference or restriction as to the profits which may be made.

The Gas Industry desires the miners to receive reasonable wages, but the burden of such must also be reasonable. It is true that there are Committees of Investigation to whom complaints of price can be made, but the members of these Committees are representatives of various interests, and in many cases the votes of the majority of the members can be counted before the complaint is heard.

Increased prices of coal will bring increased prices for gas and in turn retard the development of the Gas Industry, which really sells coal with the dirt taken out of it to industrialists as well as to the smallest domestic consumer of fuel. To stop the development of the Gas Industry would have detrimental results to the suppliers of coal, and there would undoubtedly be agitations until greater protection than at present exists of public utilities is provided.

Two Notable Centenaries.

This year has seen two centenaries of interest to the Gas Industry.

William Perkin was born on March 12, 1838, and his name ought to be kept in honoured remembrance for all time as the discoverer of the coal tar colours. He was only 18 years of age when in the course of his private research as a student of chemistry he produced from aniline a new colour which became known to the world as mauve, but at the time was commonly called "Perkin's Purple," and was the forerunner of a vast chemical industry.

Before his discovery there were probably only a dozen crude colours in common use in dyeing, but now there are more than 1,500 delicate shades available and easily used, all produced from coal tar.

On the jubilee of his first discovery he received a Knighthood which he only lived to enjoy for a year.

Friedrich Accum's death occurred on June 28, 1838, and while not endowed with the inventive and engineering talents of such pioneers of the Gas Industry as William Murdoch or Samuel Clegg, he left his mark on the Industry in various ways. He was born in Westphalia in 1769 and came to England in 1793, settling down for the next 30 years in Soho, London. Here he became associated with Winsor, who, in 1807, had lighted part of Pall Mall with gas. Accum was attracted by the new development and when the Bill for the Establishment of the Gas Light and Coke Company was in preparation he made experiments on a large scale and gave evidence for the Company before a Committee of the House of Commons. When the Company obtained its Charter in 1812 he was appointed one of the Directors.

Progress in Sunderland.

A few words about the town in which you are meeting this morning. Sunderland is by far the largest town in the County of Durham, with a population at the last census of 185,000, but now there are about 200,000 inhabitants in the County Borough. It is second only to Newcastle in the district lying between Leeds and Edinburgh.

Its chief industries are shipbuilding, engineering, and coal shipment. In 1906 ninety-nine ships of a gross tonnage of 366,000 were launched in the river, the highest output of any shipbuilding centre in the world. Since the war, however, four shipyards have been permanently closed down and sterilized, nine remaining. The town also possesses ship repairing docks and five marine engineering works, at one of which, that of Wiliam Doxford & Sons, is produced the well-known opposed piston diesel marine engine. The coal trade has been of interest to Sunderland for the past 600 years.

Besides the industries named there are the Monsanto tar works, several glass works (at one of which the well known "Pyrex" glass is produced), paper works, steel and hemp rope works, and many others. The Fulwell Lime Works which lie within the Borough area are capable of a maximum output of 2,000 tons of lime per week, and it was here that the first complete hydrated plant was installed from America which until after the war was the only one of its kind in Europe. A trading estate of 18 acres has lately been opened, offering facilities for industrial purposes.

The principal imports are grain, fuel oils, timber, esparto grass, wood pulp, and iron ore.

The Technical College has attained University status and is affiliated with the University of Durham in the Faculty of Science (Engineering and Electrical Engineering).

Sunderland also boasts a very fine sea front at Roker and Seaburn, which is provided with numerous attractions for holiday visitors.

Sunderland was first lighted with gas in 1824 from a small works supplying the south side of the river only; it was followed in 1838 by another Company having works on the north side of the river. Later these two companies competed for the supply of the whole town, but were finally amalgamated in 1854 under the title of the "Corporation Gas Company," which in 1857 changed its name to that of the "Sunderland Gas Company."

It may be of interest to members to know that for two or three years after I became connected with the Company in 1892 the price of first class Durham gas coal, delivered to the works, varied from 6s. 3d. to 6s. 6d. per ton, and the market price of sulphate (24% ammonia) was in the neighbourhood of £20 per ton.

Last year's output of gas was 1,433 million cu.ft., which includes 686 million cu.ft. of gas purchased from coke ovens seven miles away. The price charged for gas in the town has for the last half century been, and still is, one of the lowest in the country.

The Company's area of supply covers 48 square miles with some 350 miles of mains and 68,000 consumers.

It was not my purpose when preparing this Address to run through the gamut of the processes and activities of the Industry. This was done very comprehensively in 1932 by one of our past Presidents, Mr. A. C. Hovey, when he gave from the Chair an Address which constitutes a work of reference on the subject. My objective, beyond my reminiscences, has been to touch, perhaps too sketchily, on matters which have been, and are, of particular interest to myself and which I trust may not have been devoid of interest to my fellow members.

I have always had and still have the utmost faith in our great Industry. If it continues to be served by its leaders in the same able manner as it has been served in the past I have no doubt that it will continue to progress and expand, and I believe that the Gas Industry is destined to be the means of distributing heat energy in its cheapest and most convenient forms.

LONDON AND SOUTHERN DISTRICT JUNIORS

THE PRESIDENT.

Presidential Address

OF

S. C. WALDOCK,

Travelling Inspector of Accounts, The Gas Light and Coke Company.

Presented at the Opening Meeting of the Association held at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C. 1, on Tuesday, Oct. 11.

District Office Organization and Duties of Staff.

Organization in the business world has been defined by Herbert N. Casson, the Editor of the *Efficiency Magazine,* as "a body of people who work for a common end with a graded distribution of authority and responsibility and with definite methods for the acquisition of knowledge and the creation of improvements." This definition fits in very well with my ideas of the type of organization which I suggest is suitable for a district office, and which I have endeavoured to outline in this Address.

The varying conditions found in the Gas Industry make it impossible to lay down hard and fast rules, but the type of organization I have in mind is one which it is suggested is elastic and may be adapted to fit the needs of some, if not all, of those conditions. Deficiencies in organization will sooner or later result in loss of business, while on the other hand, an efficient organization will bring its reward in increased sales and goodwill.

For the purpose of this Address I have assumed that the functions of the gas sales department include all installation work from the meter, the distribution department being responsible for the laying and repair of mains and services. The sales policy of the undertaking having been decided by the directors and management, it is the duty of the gas sales department to carry it out. The principal functions will therefore be as follows:

Sales	District. Showrooms. Dealers.
Operating	Installation work. Maintenance of appliances. Remedying of miscellaneous defects.

District Organization.—The size of the area to be administered and the number of consumers in the area must, of course, be taken into account before it is possible to organize a District Office. There are also many other matters to be considered before the type of organization best suited to needs of the district can be put into operation. Other important questions which must also be carefully considered before decisions are reached are: (1) Is the self-contained unit comprising offices, showrooms, depôt, and stores likely to give the best results? (2) Are separate units (say, offices and showrooms situated in a shopping centre with the depôt and stores in a suitable position away from the shopping centre and serving one or more offices and showrooms) more or less economical? I will assume that the management, having given all these points proper consideration, has decided that the self-contained unit is best fitted to the particular area, and a chart of an organization suitable for such a unit is given in Appendix A. The organization shown in this chart closely resembles that which is still in operation at several district offices of the Gas Light and Coke Company, but it is pointed out that re-organization is in progress, and a number of district offices have recently been grouped into divisions under the control of Divisional Managers instead of Local Managers. The organization of large businesses is naturally more complicated than the smaller ones and this also applies to large district units of a gas undertaking. I am, therefore, confining these notes to the smaller units.

Duties of Staff.—The principal duties and responsibilities of the District Office Staff in an organization such as I have outlined would be on the lines indicated below:

(*a*) *District Manager.*

To control the district staff and take an active interest in all matters affecting their welfare; make contacts with influential customers, officials and members of Local Authorities, Traders' Associations, Chambers of Commerce, Rotary Clubs, &c.; study sales and other statistics; hold frequent meetings of salespeople; give special attention to all serious complaints; and do everything possible to increase sales.

(*b*) *Sales Force.*

1. *Special Representative.*—To act as senior representative and deal with special jobs as may be necessary.
2. *District Representatives.*—To follow up enquiries and turn them into sales; give estimates for installation work and all other chargeable work; collect advance payments; give advice to customers and potential customers on all matters in connexion with the supply of gas, gas-consuming appliances, coke and coke-consuming appliances; and study the technique of selling and the technical aspects of their work.
3. *Showroom Salespeople.*—To deal with customers' requests made by personal call on similar lines to those employed by the district representatives when following up enquiries; and study the technique of selling and the technical aspects of their work.

(*c*) *Complaints Section.*

Complaints Representative.—To investigate consumers' complaints of high bills, bad service, &c. (*See* also "Complaints.")

(*d*) *Operating Section.*

1. *Supervisor.*—To control labour through the foremen; give technical advice where necessary; investigate cases of inefficient appliances reported by the foremen; investigate cases of bad workmanship; investigate complaints of incomplete or incorrect deliveries of appliances, &c.; and ascertain reasons for jobs being over or under-estimated.
2. *District Foremen.*—To control and supervise the work of the fitters and assistant fitters; inspect jobs in progress where necessary; inspect certain jobs after completion, including work done by contractors; certify contractors' reports as to work performed; make tests as may be required; report cases of inefficient appliances; and inspect fitters' tool kits.

3. *Maintenance Foremen.*—To control and supervise the work of men engaged on stove maintenance, burner maintenance, and stove defects, and report cases of inefficient and obsolete appliances found by the men under his control.
4. *Storekeeper.*—To order, receive, store, and issue meters, materials, &c. (Where a warehouse is attached to the district store, stoves would also be stocked and issued to the district at the same time as meters and material); keep such records as may be considered necessary; and control and supervise the work of his assistants.

(*e*) *Home Service Section.*

1. *Consultants.*—To give public demonstrations (cookery, &c.) and give advice to consumers in the use of domestic appliances.

(*f*) *Clerical Section.*

1. *Senior Clerk.*—To supervise the work of the clerical staff; prepare statistics; keep petty cash account; certify accounts for payment; prepare budget; keep staff records; and supervise stocktaking, &c.
2. *Assistant to Senior Clerk.*—To assist the Senior Clerk.
3. *Cashier (Showroom).*—All duties in connexion with the payment of consumers' accounts, estimates, &c.
4. *District Clerks.*—To keep records; prepare statistics; perform as much of the clerical work as possible for the Special and District Representatives, such as the preparation of orders, instructions to fitters; review of fitters' reports on work done; and supervise the work of his assistants (if any).
5. *Maintenance Clerk.*—To keep records in connexion with the maintenance system; issue work to the foreman (periodical maintenance and defects); review the maintenance men's reports; and prepare statistics, &c.
6. *Wages Clerk.*—To check time cards, &c., and prepare pay-rolls and keep records in connexion with timekeeping and all matters connected with the weekly staff.
7. *Meter Reading Clerk.*—To control meter reading and meter readers (continuous system—ordinary supplies).
8. *Stores Clerk.*—To keep records; supervise the clerical work of the storekeeper; arrange stock-taking details, &c.
9. *Cost Clerk.*—To cost jobs and report serious cases of over and under estimating; keep records; and prepare cost statistics.
10. *Shorthand Typist.*—Correspondence; filing; and postage, &c.
11. *Telephone Operator.*—To attend to consumers' incoming calls and assist the staff with outgoing calls.
12. *Foremen's Clerks.*—To prepare certain material orders, job tickets (other than those prepared by District Clerks), fitters' and mates' work summary cards, &c.; keep job registers; file fitters' reports of completed work; receive and attend to fitters' telephone calls from the district; and give instructions to fitters in cases of emergency (escapes, &c.).

Random Notes on District Office Organization.

A few random notes on some of the matters closely connected with district office organization are given below.

Head Office Organization.—It is not my intention to deal with this important part of an undertaking's organization, except to point out that publicity, exhibitions, showrooms, show houses and dealers' displays, statistics, establishment, budgetary control, and many other matters affecting the control and administration of a district office organization would be dealt with by the appropriate department or, where a separate department does not form a part of the head office organization, by officers attached to the head office of the gas sales department.

The Headquarters Sales Force of the Gas Light and Coke Company deals with certain transactions on which it has been found necessary to employ specialists under the control of Section Managers. The Sections are as follows:

Catering.	New Housing.
Industrial.	Large Building.
Public Services.	

In addition to these there is a Technical Advisory Section, to which experts are attached. These men act as consultants and technical advisers to any Section of the Company regarding central heating, central water heating, ventilation, and air conditioning problems, and are responsible for many other matters of a similar nature.

Public Lighting.—In some undertakings this important section is organized on a centralized basis under the control of a Public Lighting Superintendent, while in others it is divided into areas with a public lighting inspector in charge of each unit, and a superintendent in charge of the whole. In the Croydon Gas Company's organization public lighting is under the control of the Distribution Department.

The Gas Light and Coke Company's Public Lighting Section is organized as a separate section of the Gas Sales Department under the control of the Controller of Gas Sales through the Public Lighting Superintendent. The area is divided into a number of divisions with an Inspector in charge of each division. The divisional staffs are attached to District Offices and Depôts nearest the centre of their respective divisions.

Dealer Co-operation.

Dealers.—Co-operation with dealers is now a part of the sales organization of the Gas Light and Coke Company, and a large volume of business has resulted since the inception of the scheme. Some of these dealers employ salespeople who make contacts with potential customers where there are prospects for business in the domestic field, leaving the following-up of direct enquiries to the permanent staff of the Company. The dealers' salespeople are given an intensive course of training by the Company's training staff. The dealers are paid commission at varying rates according to the class of business obtained.

Prospects.—Employees of the Gas Light and Coke Company are encouraged to interest consumers in gas and coke appliances and to send in prospect cards. Commission is paid on orders resulting from the introduction of customers. This scheme has met with great success, a large number of orders having been obtained since its inception a few years ago.

Suggestions.—Employees of the Gas Light and Coke Company are encouraged to send in suggestions for improvements of all kinds. These suggestions, after being carefully considered by the appropriate senior officer, are dealt with by an Awards Committee, who make monetary awards for suggestions which are considered to be of benefit to the Company.

Maintenance Service.—The importance of a well organized and efficient maintenance service cannot be too strongly stressed. Periodical inspections of stoves and other appliances by skilled men will ensure that they are maintained at the highest standard of efficiency thus enabling the users to get the utmost value for the money expended in the purchase of gas.

The Maintenance Service of the Gas Light and Coke Company is organized on the following lines.

Inspections and repairs are dealt with by groups or teams of men called Inspection Men, who, commencing at one point of the area covered by a District Office, proceed right through that area. Their duties include the overhauling of the appliances and the remedying of minor defects. Major defects determined principally from the length of time it would take to effect their repair are dealt with by men who follow up the Inspection Men, and who are termed Repair Men, but this does not apply to certain appliances which are fully dealt with by the Inspection Men.

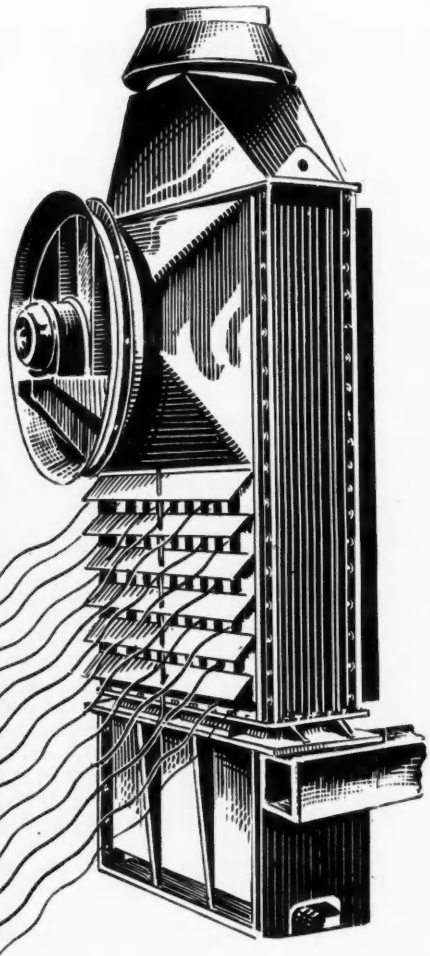
For inspection purposes appliances are divided into five groups, which are dealt with from year to year according to the number of inspections per annum or the season of the inspection and so on according to the type of appliance.

Work other than inspection work is not done as a general rule by the Inspection Men, whether requested by customers or not, but they are allowed to secure leakages temporarily. These leakages, together with any other defects reported to or noticed by Inspection Men, are reported by them on the continuous record relative to the job, anything of an urgent nature being telephoned to the District Office immediately. In cases where the customer insists on some attention being given the Maintenance Man may do what he can to give temporary

FOR QUICK EFFICIENT

Workshop and Factory

HEATING



The Newcotherm not only heats the room correctly — it does it **almost immediately.**

Unlike a radiator, from which heated air raises straight **up** to the roof, the Newcotherm directs the warm current **down** (from about 12 ft.)

Within minutes of starting, it is circulating warm air through the room.

To know more about this unit, which is fully automatic, so cheap to run and does not occupy useful shop space, write for leaflet.

NEWCOTHERM

NEWTON CHAMBERS & CO., LTD. · THORNCLIFFE IRONWORKS · Nr. SHEFFIELD

relief and report the matter so that further attention can be given.

This brief description of the Gas Light and Coke Company's Maintenance Service is taken from the "Maintenance Service Manual," a copy of which is given to each employee engaged in this work. This Manual is intended to be used by Maintenance Men as a book of reference and is, of course, supplementary to the training received by them in the Company's training shops. Within its 183 pages the Manual, which is pocket size, also includes the duties of Maintenance Men and gives valuable information in detail for a considerable number of appliances and deals with others in a general way.

Complaints.—A special officer should be detailed to deal with certain complaints. Although it may be possible to settle satisfactorily some complaints by letter, a personal call is by far the best method. The classes of complaints, &c., which would be dealt with by the Complaints Representative include the following:

(*a*) Disputed consumptions.
(*b*) Disputed appliance rentals.
(*c*) Disputed fixing charges.
(*d*) Disputed maintenance charges.
(*e*) Claims arising from damage to premises by employees.
(*f*) Serious cases of delays in delivery or fixing.

Other duties which may be allocated to the Complaints Representative are:

(*a*) Collection of "open" accounts.
(*b*) Estimating charges for gas.
(*c*) Investigating fires, explosions, &c.

Complaints of defective workmanship, incomplete or incorrect deliveries of appliances, &c., would be investigated by the Operating Supervisor, who would also take disciplinary action in cases of damage to premises by employees.

Importance of Analyzing Complaints.

I would stress the importance of analyzing complaints, &c., as by this means only can a true picture be obtained. Underlying causes may be found to be attributable to carelessness, inexperience, incompetence, system defects, or other reasons. A careful study of the conclusions arrived at after investigation will greatly assist in deciding what action it may be necessary to take to remove the causes and so prevent recurrences.

District Emergency Organization.—It is hardly necessary to stress the great importance of an efficient emergency service capable of dealing with all kinds of urgent calls at any time of the day or night. So far as escapes and other urgent defects reported during normal working hours are concerned, the Gas Light and Coke Company's District Office Organization makes provision for these emergencies through the Foreman's Office. A fitter is instructed to proceed to the consumer's premises, when he telephones from the district to the Office at pre-arranged times, or a Foreman's Clerk is specially sent to the district to withdraw a fitter.

Between the close of normal business and 8 p.m. (Saturdays 1 p.m.) fitters are detailed to stand by for emergency work at the District Depôt. From Monday to Friday stand-by fitters are on duty in their homes from 6 p.m., on Saturday from 1 p.m., and on Sundays and Public Holidays from 7.30 a.m., until 7.30 a.m. on the following days. The service is operated on a rota system, allowing for reserves to be on call in case the stand-by fitter on duty for the week is called out on an emergency.

The men detailed for these duties are fully qualified fitters, who must reside within reasonable proximity to the office to which they are attached, be expected to provide and be able to ride a cycle, and to have a telephone installed at their residences.

Analysis of Gas Consumptions.—Some progress has been made during the last few years in connexion with the classification of premises and the compilation of consumption statistics. The Gas Light and Coke Company are now able to ascertain from their Rental Department the total quarterly consumption in each District Office area, the average consumption per account, and the proportion of the total consumption in each of the following classes:

1. Private residences (separate figures for ordinary, automatic, and gas prepayment customers).
2. Retail establishments.
3. Restaurants, public-houses, cafés, fish fryers, eating houses, bakers, &c.
4. Hotels, boarding houses, clubs, lodging houses.
5. Offices, banks, warehouses.
6. Public bodies, authorities, institutions, hospitals, places of worship, theatres, cinemas.
7. Factories, workshops, garages.
8. Street lighting.
9. Unclassified.

Sales statistics, such as those mentioned above, may become an expensive luxury unless they are used to the fullest possible extent both by the Management and the District Staff. This applies especially to the District salespeople, who are more likely to respond to any appeal made to increase sales in this or that direction if supplied with useful and interesting information of this nature at regular intervals. In this way an element of friendly competition between areas can be encouraged and an incentive given which will stimulate salespeople to still greater efforts.

Transport.—The rapid increase in the number of mechanically-driven vehicles generally and the facilities now available for the transport of the public have made it necessary to meet the demand for speed in activities associated with all business firms. Many gas undertakings have adopted motor transport for the use of executives, salesmen, foremen, and fitters. Motor vans are now used for a number of services, such as the delivery of meters, appliances and material, maintenance work, exchanges of meters and stoves, express messenger service, &c. Equipment for the clearing of service pipes is also available in the shape of a vacuum service cleaner. The method of delivery to consumers' premises varies. Some undertakings still deliver stoves direct to consumers from a central store (not necessarily a part of the gas sales organization), leaving the meters and material to be supplied by a local district store and issued to the fitter responsible for doing the job. This method will, of course, involve the use of fitters' trucks. Where the appliances are delivered in bulk to a local district store in execution of individual orders or where a local district stove store forms a part of a district depôt, meters, appliances, and material can be delivered by motor van, and the fitters are then able to use bicycles or public transport conveyances. Where a central distributing store is available the meters, appliances, material, and certain heavy tools can be transported direct to jobs, the fitters following on from a district depôt the next day either on foot, by bicycle, or public transport vehicle, according to the distance between the district in which the fitters are working and the local fitters' depôts to which they are attached. This latter method is now largely employed by the Gas Light and Coke Company.

Clerical Operations.—The speeding up of all operations has become necessary to give customers the service which they have every right to expect. The time lag between the placing of an order and its execution must, therefore, in these days be reduced to the minimum. With this object in view, some control of clerical operations becomes necessary. A study of clerical operations connected with an order will reveal which of these must be performed by senior members of the clerical staff and those which can be given to the juniors. Control of output and efficient supervision should ensure a better distribution of work, elimination of delays, and avoidance of arrears. By this means also peak loads can be dealt with more satisfactorily, and a certain amount of overtime prevented. Where a large volume of certain kinds of clerical work is involved, it may be found advantageous to centralize the work within the office and use office machinery for the

preparation of certain documents and for other purposes, such as the preparation of receipts and pay rolls.

Internal Audit.—A considerable portion of the clerical work of the Gas Sales Department (Gas Light and Coke Company) is subjected to inspection and/or audit by the staff attached to the Internal Audit Section of the Budget and Audit Department.

Education of Rank and File.

Education and Training.—Educational facilities available to the rank and file of gas undertakings are now well known. It is therefore unnecessary for me to refer to this subject at any length, but I would like to take this opportunity of stressing the importance to all employed in the Gas Industry of extending their knowledge of technical and commercial subjects. Too little knowledge may be a dangerous thing, but, on the other hand, one cannot have too much knowledge of the commodities dealt with by the employees of gas undertakings or of the utilization of those commodities.

Where expense is a factor in connexion with the study of subjects connected with the manufacture and supply of gas, it will be found that most public lending libraries now cater for students by providing a selection of text books, technical journals, &c. There is a possibility that books of this nature may be found to be out-of-date but the remedy lies very largely in the hands of the student. I have found by past experience that recommendations made to the proper authorities will invariably receive sympathetic consideration.

As regards the training of personnel, the Gas Light and Coke Company may be regarded as pioneers. Not the least important function of the Watson House experts is that of training apprentices, salesmen, &c., and conducting "refresher" courses for fitters, salesmen, &c. Intensive courses for some of the clerical staff and also the training of telephonists for the special duty of dealing with consumers' complaints communicated by telephone have recently been added.

Most members of the Sales Force attached to a District Office are engaged in selling direct to users. Direct selling requires a different technique of salesmanship to that required, say, in selling to retailers; it is therefore necessary to select the staff very carefully. Much skill is required to ensure the selection of the type possessing all the qualities which go to make up the efficient salesman. Unless the right type is selected it is obviously useless to spend money on their training. Provided that members of the Sales Force have been skilfully selected there can be no question that education and training carried out on right lines can be of incalculable benefit, not only in enhancing the value of their service to the consumer and the goodwill of the undertaking, but also in making the daily round and common task of the sales-people much more interesting and enjoyable.

Although it is not possible for every gas undertaking to enjoy such facilities as are available in London, nevertheless there are many which have their own schemes of education and training in addition to those of a national character, and every encouragement is given to their employees to extend their knowledge. Money spent in this way is a good investment and no undertaking can afford to neglect this side of their activities if efficient consumer service is to be maintained.

Valuable Work of Junior Associations.

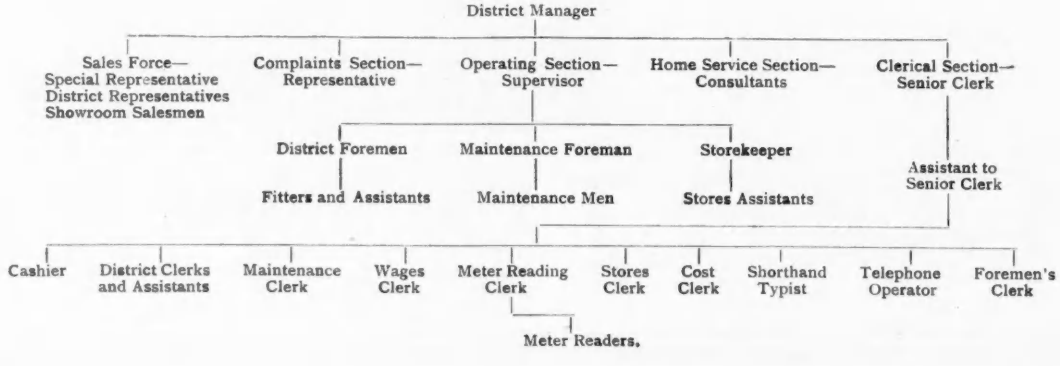
The seven British Junior Gas Associations are all contributing to this valuable work, and it seems likely that their efforts in this direction will be more fully recognized in the near future. Perhaps it would not be out of place to mention here that in addition to the usual facilities given to members of Junior Gas Associations, some undertakings also show their appreciation of the work of the Associations by paying the subscriptions of members of their staffs. If the other undertakings who are not yet doing so can see their way to coming into line, the gesture will, I am sure, be greatly appreciated by all concerned.

Social Welfare.—The many schemes having for their object the welfare of employees in the Gas Industry are well known. It is not therefore necessary to enumerate them here.

There are, however, some aspects of social welfare without which no district organization would be complete. I refer to those social and sporting activities of employees, such as concerts, dances, whist drives, and sporting events of all kinds. Some undertakings provide the necessary recreation rooms and facilities for outdoor sports. Every encouragement is given to employees to enable them to spend their leisure hours usefully. The goodwill, loyalty, and team spirit of employees can be secured, encouraged, and maintained by efforts of this kind. Most people will be found to react in the right way to healthy recreational facilities, and any time spent by the district manager in actively supporting this useful and important side of the district organization will be well repaid by the harmonious relations resulting therefrom.

My principal object in choosing this subject for my Address was to try to create an interest in district office organization, and to draw attention to the possible benefits which might accrue from a review and overhaul of the organization. Reorganization should not be attempted until an exhaustive study and analysis have proved that real improvements can be effected. The *pros* and *cons* must be carefully weighed before any action is taken. If such a result is achieved I shall feel that my efforts have not been wasted. Many of the matters mentioned in this Address might very well be made the subject of whole Papers, but I am hopeful that my inadequate attempt to deal with them within the limits of this Address may serve the purpose which I had in mind when choosing my subject.

APPENDIX A.

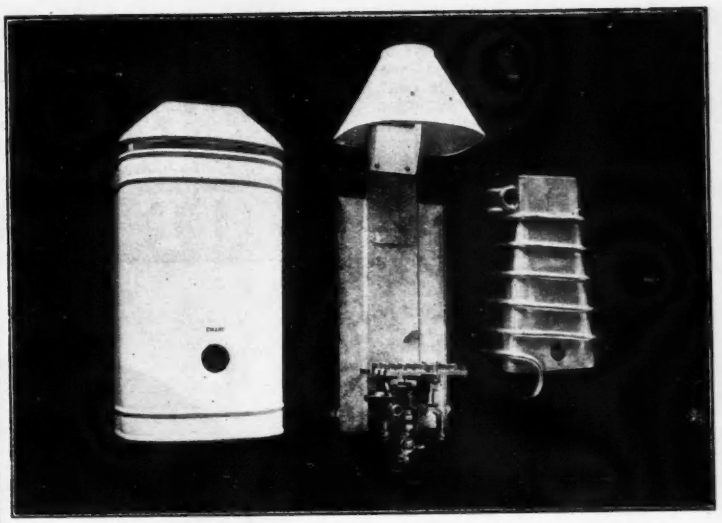


1938 'EMPIRE' GAS WATER HEATER

WITH BAFFLER, THERMOSTATIC PILOT CONTROL VALVE, GAS GOVERNOR, AUTOMATIC LIGHTER, AND HAND ADJUSTED TEMPERATURE CONTROL.

Every part of the 'Empire' Water Heater is accessible for cleaning and adjustment. The outer casing and heating unit can easily be removed and replaced without displacing the vent pipe or removing the baffler. The gas governor prevents wastage of fuel and undue wear of the heating unit.

MULTI-POINT HEATER
Capacity 3½ Galls. per minute
List price £12 . 0 . 0
INCLUDING CHROMIUM PLATED GAS TAP



For particulars and prices of other Heaters, single or multi-point, write to

EWART & SON LTD.

ESTABLISHED 1834

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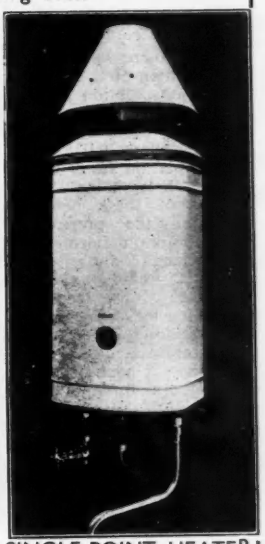


SINGLE-POINT HEATER
Capacity 3½ Galls. per minute
List price £12 . 15 . 0
INCLUDING CHROMIUM PLATED SWIVEL SPOUT, GAS AND WATER TAPS

321

AT WOLVERHAMPTON GAS WORKS.

EFFICIENT CONDENSERS

SCIENTIFICALLY DESIGNED

BEST MATERIALS

HIGHEST WORKMANSHIP

INDIVIDUAL CONDITIONS STUDIED

C. & W. WALKER LTD.

DONNINGTON, NR. WELLINGTON—SHROPSHIRE

'Phone : Lilleshall-Shropshire Nos. 34 & 35 (2 lines)
'Grams : "Fortress," Donnington, Shropshire

LONDON OFFICE :
70, VICTORIA ST., WESTMINSTER, S.W.1.
'Phone : Victoria No. 1941
'Grams "Fortress," Sowest, London.

Gas Undertakings' Results

Blackpool.

An increase of close upon 5% in the quantity of gas sold is reported by the County Borough of Blackpool Gas Department for the year ended March 31 last; the figures being 1,455,665,600 cu.ft., as compared with 1,387,604,300 cu.ft. At the end of the period there was a total of 41,633 consumers, of whom something more than 50% are supplied with prepayment meters. The average consumption per consumer during the year was 31,726 cu.ft. Dividing-up this satisfactory figure, the average consumption through ordinary meters was 44,144 cu.ft., and through prepayment meters 20,075 cu.ft. The business is still growing, for during the year no fewer than 1,398 new consumers were connected to the supply mains. From the figures, however, it seems that the bulk of these new consumers are on prepayment supplies. Taking the prepayment meters as a whole, the average consumption during the year shows a decrease of 84 cu.ft. per meter, due, it is stated, "to the loss of the domestic lighting load to electricity, which is entirely beyond the control of the Department under the present system of sales of lighting fittings." Further improvements have been carried out in connexion with the public lighting, and there has been a considerable increase in the installation of gas-fired central heating boilers. Under the present scale of charges prices range from 7d. per therm up to 45 therms per quarter, down to 4d. per therm over and above 13,500 therms per quarter, subject to discount; the average price received over the year for all gas sold being 6·32d. per therm net. Of the net profit of £23,355, it is proposed to allocate £2,000 to the General Rate Fund.

Bradford.

The operations of the City of Bradford Gas Department during the twelve months ended March 31 last resulted in a net profit of £7,183, which compares with £22,914 for the preceding year. The reduction is more than accounted for by increases in expenditure and in net revenue charges. The average price realized for gas has been reduced from 2s. 10·85d. to 2s. 9·79d. per 1,000 cu.ft.; this change being due to increased consumption at the two-part rate of charge. The total sales of gas for the year were 1,933,779,000 cu.ft., as compared with 1,982,339,000 cu.ft. in the previous twelve months—a decrease of 48,560,000 cu.ft., or 2·45%. This decrease in output is attributed to the very mild weather experienced during the March quarter, together with the depressed state of industry in the city throughout the greater part of the year, and also to the effect of competition. The cost of the fuel and oil used in the manufacture of carburetted water gas was £76 more than a year ago; the quantity of gas made by this process being some 4,000,000 cu.ft. more. Sewage grease and gas oil have again been used for enrichment of the C.W.G. The industrial gas section has made further progress, and many additional loads have been obtained during the year.

Stockport.

Mr. T. Reynolds, Engineer and Manager of the Stockport Gas Department, in his annual report, states there has been an increase of gas sold of 5,623,200 cu.ft., or 25,304 therms, equivalent to 0·46%. The revenue income during the year was £292,431, compared with £278,925 in the previous year. The number of consumers was 51,484, an increase of 2,680 over the previous year; 30,034 consumers were supplied through prepayment meters and 21,450 through ordinary meters. The gas sold for industrial purposes during the year totalled 244,050,700 cu.ft., against 222,817,400 cu.ft. the previous year. The number of appliances sold at the showrooms during the year was 7,822, total value £53,009. Athletic and Social.

Long Service Presentations

To Employees of Cannon Iron Foundries, Ltd.

The Directors of the Cannon Iron Foundries, Ltd., Deepfields, Bilston, on Oct. 6 last presented solid silver salvers to two members of the staff who have completed 50 years' of service with the Company. They were Mr. Isaac Grainger, of the Sales Department, and Mr. E. Flavell, Chief Wages Clerk. At the centenary of the Company, which was held in Blackpool in 1926, Mr. Grainger and Mr. Flavell each received gold watches to commemorate approximately 40 years' service.

BUILT TO WITHSTAND THE TEST OF TIME

A lock apparently may be soundly constructed, may even guarantee you a certain amount of protection . . . but unless it will go on giving you that protection year in and year out, you cannot regard it as an economical proposition. M & M Meter Locks — the sturdiest, safest locks on the market—are built to give you satisfactory service for as long as the meter lasts. Let us send you a skeletonised lock showing interior construction.

H. MITCHELL & CO. LTD., 3/5, Leighton Road, N.W.5.

Avoid imitations—there are many on the market. Look always for the patent number stamped on every genuine M & M Meter Lock.

M & M PATENT METER LOCKS

Carew Wilson

Markets and Manufactures

Current Sales of Gas Products

The London Market

LONDON, *Oct.* 10.

Prices of Tar Products generally in the London market remain unchanged, to-day's values being as follows:

Pitch nominal at about 33s. per ton f.o.b.
Creosote, about 4⅜d.
Refined tar, 3¾d.
Pure toluole, about 2s. 3d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, 10s.
All per gallon naked at makers' works.

The Provinces

Oct. 10.

Crude Gas-Works Tar, 15s. to 20s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 31s. to 32s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. to 32s.* Toluole, naked, North 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¼d. to 4⅜d.; low gravity, 4¼d. to 4⅜d. Carbolic acid, 60's, 1s. 9d. to 2s. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable. †Heavy oil: Unfiltered anthracene oil, min. gr. 1.080, 4¾d. to 4⅞d.; filtered anthracene oil, min. gr. 1.080 5¼d. to 5⅜d.; heavy tar oil, gr. less than 1.080, 4½d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

† It has been pointed out to us that Unfiltered Heavy Oil is more generally known in the trade as Unfiltered Anthracene Oil, and we therefore intend to refer to it as such in future.

Scotland

GLASGOW, *Oct.* 8.

While there is, if anything, a slightly better feeling in the market generally, orders are still scarce and quotations show no material alteration.

Crude gas-works tar.—Actual value is about 37s. to 38s. per ton *ex* works in bulk.

Pitch is difficult to move with prices easy at round 23s. to 24s. per ton f.o.b. for export and about 21s. to 22s. per ton in bulk for home trade.

Refined tar is maintained in the home market at 3¾d to 4d. per gallon, while in the export market competition is keen at round 3d. per gallon in buyers' packages at makers' works.

Creosote oil.—There is very little new business being placed and prices are approximately as follows: Specification oil, 4½d. to 4¾d. per gallon; low gravity, 5d. to 5½d. per gallon; neutral oil, 4¾d. to 5d. per gallon; all *ex* works in bulk.

Cresylic acid.—Some small orders are being placed and quotations are as follows: Pale, 97/99%, 1s. 4d. to 1s. 6d. per gallon; dark, 97/99%, 1s. 2d. to 1s. 4d. per gallon; and pale, 99/100%, 1s. 6d. to 1s. 10d. per gallon; all according to quality, *ex* works in buyers' packages.

Crude naphtha is steady at 5½d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade can be secured at 1s. 3½d. to 1s. 4d. per gallon; and 90/190 heavy naphtha at 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is valued at 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—90/160 grade is 8s. to 9s. per gallon and 90/140 grade is 9s. to 10s. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole . .	0	9½	to 0	10		per gall. at works
Motor ,, . .	1	3	,, 1	3½	,,	,, ,,
90% ,, . .	1	4	,, 1	4½	,,	,, ,,
Pure ,, . .	1	8	,, 1	8½	,,	,, ,,

Dividend Announcements

Caledonian Gas Corporation, Ltd.—Close Brothers, Ltd., Secretaries, announce that the Directors of the Caledonian Gas Corporation, Ltd., have declared an interim dividend on the Preferred Ordinary Shares of 2¼%, less tax, at 5s. 6d. in the £, payable on Oct. 19.

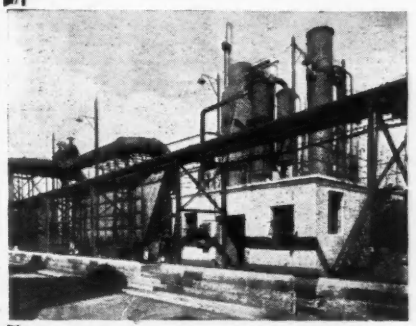
Imperial Continental Gas Association.—For the half-year ended Sept. 30, 1938, interim dividend at the rate of 4% (actual) on the £5,600,000 Capital Stock of the Association be paid, less income-tax, in the £, on Nov. 15, 1938.

Oriental Gas Company.—On Oct. 6 the Directors of the Oriental Gas Company, Ltd., recommended the payment of a final dividend of 4½%, free of income-tax, payable on Nov. 18, making 8%, free of income-tax, for the year ended June 30 last. The General Meeting of the Company is to be held on Nov. 17.

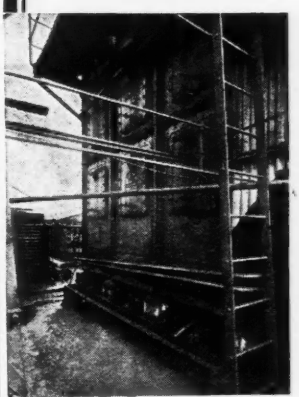
Pressure Control Without "Relay"

A handsome leaflet in colour has been published by Messrs. W. & B. Cowan, Fitzalan Street Works, Kennington Road, S.E. 11, giving an example of an actual chart from the inlet of a "BK" retort house governor. The "BK" has been designed for extreme accuracy of governing by the elimination of inertia and friction and by control of tar deposition. It is completely enclosed and dust-proof, and is claimed to achieve a saving in leakage, more therms per ton, less wear on refractories, longer life of retorts, and reduction of stopped ascension pipes.

Every Joint Sound!



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints like these in important Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil—screw pipe or flange.

Send for particulars

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Sole manufacturers:—

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REPEAT ORDERS

ARE NOW IN HAND FOR EXTENSIONS TO GLOVER - WEST VERTICAL RETORTS FOR THE FOLLOWING UNDERTAKINGS

- **Bedford**
- **Bergen**
- **Blackpool**
- **Coatbridge**
- **Coventry**
- **Dublin**
- **Hull (East)**
- **Leeds**
- **Le Mans**
- **Motherwell**
- **Oldbury**
- **Perth**
- **Romford**
- **Slough**
- **Sydney**

GLOVER-WEST VERTICAL RETORTS

. . . for coal carbonization with the advantages of modern scientific control

WEST'S GAS IMPROVEMENT CO. LTD.,

MANCHESTER: Albion Ironworks, Miles Platting ■ LONDON: Columbia House, Aldwych, W.C. 2

GAS STOCKS AND SHARES

After a firm opening last week, business on the Stock Exchange began to fall off and the prices reached the previous Friday were not maintained, but having regard to the violent rises this reaction was more or less anticipated. Later on in the week, however, a better tone set in, and although there was no material revival of activity there were signs of increasing interest. It is evident that the future of the European problem must become much clearer before conditions on the Stock Exchange return to normal.

Business in the Gas market, although still small, was a little heavier than for the past two weeks, and it will be seen in the Lists that more issues have recovered most of their losses while some now stand higher than before the crisis. In a number of cases margins have been narrowed down again to five points. Apart from *ex*-div. markings there were a few depreciations, though none of a serious nature. The Mid-Southern Utility Company's £125,000 3½% redeemable bonds are now officially quoted and have been included in the List below.

The Imperial Continental Gas Association has declared an interim dividend of 4% on the £5,600,000 capital stock (payable Nov. 15), the same rate as that paid for the previous two years. At the time of writing the stock is on offer at 124 cum-div., which on the basis of a 10% per annum dividend, gives a return of £8 1s. 3d.%.

The Caledonian Gas Corporation has announced an interim dividend on the preferred ordinary shares of 2¼% (payable Oct. 19). This subsidiary of the United Kingdom Gas Corporation directly controls 19 gas undertakings in Scotland.

Parcels of nearly all the leading ordinary stocks are available at the present time and the yields at current prices are attractive. The list includes the following:

Amount Offered.	——	Price.	Yield, %		
£			£	s.	d.
2,000	Commercial	83	6	0	6
100	Gas Consolidation "A"	17/6	5	14	3
5,000	" "B"	20/7½	5	15	6
1,000	Severn Valley Gas Corporation	22/3 xd.	4	18	9
500	South Eastern Gas Corporation	23/-	5	4	3
500	South Metropolitan	106	5	3	9
2,000	South Western Gas and Water	17/6 xd.	5	14	3
2,000	United Kingdom Gas Corporation ..	19/- xd.	5	2	6

The United Kingdom Gas Corporation have placed privately £66,186 of 3½% redeemable debenture stock, bringing the amount outstanding to £1,066,186 out of an authorized total of £1,200,000. The stock is redeemable at 102% on Oct. 1, 1960, and is on offer at 97¾ free to give a yield, allowing for redemption, of £3 15s. 6d.%, or £3 11s. 6d.% flat.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 7.	Rise or Fall on Week.
1,767,439	Sept. 5	8	8	Alliance & Dublin Ord. ...	132—142	...
374,000	June 20	4	4	Do. 4 p.c. Deb. ...	93—108	...
734,733	May 9	5	5	Asscd. Gas & Water U'd'ts Ord.	17/6—19/6	...
500,000	"	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/-	...
444,389	"	§-/4	4	Do. 4 p.c. Red. Cum. Pref.	19/—20/-	...
296,523	"	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/-	...
500,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
560,070	Aug. 22	7	7	Barnet Ord. 7 p.c.	157—162	...
300,000	Apl. 4	1/4⅜	1/9⅜	Bombay, Ltd.	24/6—26/6	...
180,435	Aug. 22	9½	9½	Bournemouth sliding scale ...	195—205	...
640,407	"	7	7	Do. 7 p.c. max. ...	152—162	+7
495,960	"	6	6	Do. 6 p.c. Pref. ...	130—135	−2½
50,000	June 20	3	3	Do. 3 p.c. Deb. ...	75—80	+2
312,025	"	4	4	Do. 4 p.c. Deb. ...	95—100	...
335,000	"	5	5	Do. 5 p.c. Deb. ...	115—120	+2½
357,900	Aug. 8	7½	7½	Brighton, &c., 6 p.c. Con. ...	142—147	...
659,955	"	6½	6½	Do. 5 p.c. Con. ...	126—131	...
205,500	"	6	6	Do. 6 p.c. 'B' Pref.	120—125	...
855,000	Sept. 19	8	7	British Ord.	137—142*	+1
100,000	June 3	7	7	Do. 7 p.c. Pref.	140—145	...
350,000	"	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	"	4	4	Do. 4 p.c. Red. Deb. ...	95—100	+5
450,000	"	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,000	"	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
100,000	22 May'33	6	4	Cape Town, Ltd.	1—2	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...
150,000	June 20	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	July 18	6	6	Cardiff Con. Ord.	118—123	...
237,860	June 3	5	5	Do. 5 p.c. Red. Deb.	105—110	...
98,936	Sept. 19	2/-	2/-	Colombo Ord....	1⅞—1¾*	...
24,510	"	1/4½	1/4½	Do. 7 p.c. Pref.... ...	22/6—24/6*	...
739,453	Mar. 21	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...
296,144	"	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/—25/-	...
1,775,005	Aug. 8	5	5	Commercial Ord.	79—84	...
140,000	..	—	§13/4	Do. 4 p.c. Red. Pref.	95—100	...
620,000	June 3	3	3	Do. 3 p.c. Deb. ...	70—75	...
286,344	Aug. 22	5	5	Do. 5 p.c. Deb. ...	113—118	+½
200,000	"	—	§30/2	Do. 3½ p.c. Red. Deb.	95—100	...
807,560	Aug. 8	7	7	Croydon sliding scale ...	135—140	...
644,590	"	5	5	Do. max. div. ...	98—103	...
620,385	June 20	5	5	Do. 5 p.c. Deb. ...	113—118	+½
239,000	Aug. 8	5	5	East Hull Ord. 5 p.c.	95—100	+1
186,155	Aug. 8	6	6	East Surrey Ord. 5 p.c. ...	116—121	...
176,211	June 3	5	5	Do. 5 p.c. Deb. ...	112—117	+1½
250,000	July 4	4	8	Gas Consolidation Ord. 'B' ...	19/—21/-	...
250,000	May 9	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
9,223,324	Aug. 8	5⅝	5⅝	Gas Light & Coke Ord. ...	22/—24/-d	...
2,600,000	"	3½	3½	Do. 3½ p.c. max. ...	75—80	+2½
4,477,106	"	4	4	Do. 4 p.c. Con. Pref. ...	96—101	+1
2,993,000	July 4	—	3½	Do. 3½ p.c. Red. Pref. ...	98—103	+3
8,602,497	May 23	3	3	Do. 3 p.c. Con. Deb....	77—82	+3
3,642,770	"	5	5	Do. 5 p.c. Red. Deb....	110—115	...
3,500,000	"	4½	4½	Do. 4½ p.c. Red. Deb....	109—112	+1
700,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb....	93—98	+3
270,466	Aug. 22	6	6	Harrogate New Cons. ...	117—122	...
157,500	Mar. 21	1/2⅝	‡1/-	Hong Kong and China Ord. ...	½—1	...
213,200	Aug. 8	6	5⅝	Hornsey Con. 3½ p.c ...	97—102	...
5,600,000	May 9	8	12	Imperial Continental Cap ...	115—125	...
223,130	July 18	3½	3½	Do. 3½ p.c. Red. Deb....	87—92	...
235,242	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	164—169	...
11,751	Aug. 22	10	8	Maidstone 5 p.c. Cap. ...	175—185	...
63,480	June 20	3	3	Do. 3 p.c. Deb.... ...	70—75	...
45,000	May 23	†10	†10	Malta & Mediterranean ...	135—140	...
				Metropolitan (of Melbourne)		
392,000	Oct. 3	5½	5½	5½ p.c. Red. Deb.	97—100*	−2
231,977	Aug. 22	5	5	M.S. Utility 'C' Cons. ...	95—100	...
968,658	"	4	4	Do. 4 p.c. Cons. Pref.	95—100	+2
390,076	June 20	4	4	M.S. Utility 4 p.c. Deb. ...	95—100	...
148,955	"	5	5	Do. 5 p.c. Deb. ...	113—118	...
125,000	July 1	3½	3½	Do. 3½ p.c. Red. Bds.	95—98	...
675,000	May 9	†6	†6	Montevideo, Ltd.	73—78	...
250,000	Aug. 8	7½	7½	North Middlesex 6 p.c. Con.	142—147	...
396,160	Aug. 8	5	5	Northampton 5 p.c. max. ...	105—110	...
300,000	Apl. 25	†9	†7	Oriental, Ltd.	147—152	...
468,537	June 3	8	8	Plymouth & Stonehouse 5 p.c.	140—150	...
621,667	Aug. 8	8½	8½	Portsmouth & Gosport Cons.	157—162	...
241,446	"	5	5	Do. 5 p.c. max. ...	100—105	...
73,350	"	5	5	Do. 5 p.c. Pref. ...	107—112	...
75,000	"	4	4	Do. 4 p.c. Pref. ...	90—95	...
114,000	Aug. 8	5	5	Preston 5 p.c. Pref.	105—110	...
247,966	June 3	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	July 18	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Sept. 5	6	6	San Paulo 6 p.c. Cum. Pref. ...	8½—9*	...
441,275	Sept. 19	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	20/6—22/6*	...
460,810	Sept. 19	-/10½	-/10½	" " 4½ p.c. Cum. Pref.	19/6—21/6*	...
133,201	Aug. 22	5	8½	Shrewsbury 5 p.c. Ord. ...	127—132	...
9,000	June 3	4	‡4	South African Ord.	4½—5½	...
1,371,752	Aug. 22	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	21/—23/-	...
871,636	"	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...
498,818	"	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/-	...
450,000	Aug. 8	4	4	Do. 4 p.c. Deb.	99—102	...
150,000	"	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—97	...
6,709,895	Aug. 8	6	5	South Met. Ord.	102—107	...
1,135,812	"	6	6	Do. 6 p.c. Irred. Pref. ...	125—130	...
850,000	"	4	4	Do. 4 p.c. Irred. Pref. ...	95—100	...
1,895,445	June 20	3	3	Do. 3 p.c. Deb.	75—80	+1
1,000,000	July 4	5	5	Do. 5 p.c. Red. Deb. ...	107—112	+2
600,000	"	—	§31/-	Do. 3½ p.c. Red. Deb. ...	97—102	+4
1,543,795	Aug. 8	6	6	South Suburban Ord. 5 p.c. ...	113—118	+½
512,825	"	5	5	Do. 5 p.c. Pref.... ...	108—113	...
500,000	"	4	4	Do. 4 p.c. Pref.... ...	95—100	...
250,000	"	3½	3½	Do. 3½ p.c. Red. Pref. ...	90—95	...
888,587	June 3	5	5	Do. 5 p.c. Deb.	113—118	...
250,000	"	4	4	Do. 4 p.c. Deb.... ...	95—100	...
200,000	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
427,859	Sept. 19	8½	9½	S. Western Gas & Water Ord.	16/—18/-*	...
160,523	"	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pf.	19/—21/-	...
110,000	June 3	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
750,541	Aug. 8	5½	5	Southampton Ord. 5 p.c. ...	105—110	...
148,836	June 3	4	4	Do. 4 p.c. Deb. ...	95—100	...
350,000	Aug. 8	5½	5½	Swansea 5½ p.c. Red. Pref. ...	105—110	...
200,000	June 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	−2
1,076,490	Aug. 8	6½	6½	Tottenham and District Ord.	125—130	...
409,835	"	5½	5½	Do. 5½ p.c. Pref. ...	115—120	...
62,235	"	5	5	Do. 5 p.c. Pref. ...	108—113	...
334,615	June 3	4	4	Do. 4 p.c. Deb. ...	95—100	...
85,701	Apl. 25	6	6	Tuscan 6 p.c. Red. Deb. ...	95—101	...
1,131,550	Aug. 22	6	4	U. Kingdom Gas Cor. Ord. ...	17/—20/-	...
1,051,280	May 9	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/—21/-	...
762,241	"	-/1·15	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/-	...
745,263	June 3	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/—18/-	...
1,066,186	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—98	...
375,689	Aug. 8	7	7	Uxbridge, &c., 5 p.c.	120—130	...
133,010	"	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Aug. 8	7	7	Wandsworth Consolidated ...	135—140	...
2,525,768	"	4	4	Do. 4 p.c. Pref. ...	95—100	...
1,343,964	June 3	5	5	Do. 5 p.c. Deb. ...	113—118	...
383,745	"	4	4	Do. 4 p.c. Deb. ...	95—100	...
400,000	"	—	§25/-	Do. 3½ p.c. Red Deb.	97—102	+2
558,342	Aug. 8	7	6⅝	Watford and St. Albans Ord.	125—130	...
200,000	"	5	5	Do. 5 p.c. Pref. ...	105—110	...
200,000	"	5½	5½	Do. 5½ p.c. Pref. ...	110—115	...
200,000	"	—	16/8§	Do. 4 p.c. Red. Pref.	95—100	...
200,000	June 3	4	4	Do. 4 p.c. Red. Deb.	96—101	...
200,000	"	3½	3½	Do. 3½ p.c. Red Deb.	90—95	...

d.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Oct. 7.	Rise or Fall on Week.
202,152	Sept. 5	5	5	Ascot Ord.	101—106	...
128,182	July 18	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Aug. 22	-/4½	-/4½	Associated Utilities 4 p.c. Pref.	16/—18/-	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Aug. 22	8	8	Bognor Orig. Ord. 'A' ...	155—165	...
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	145—155	...
37,440	Aug. 8	10	10	Cam. Univ. & Town 10 p.c. max.	188—198	...
125,970	,,	7	7	Do. 7 p.c. max.	133—138	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	July 18	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Aug. 8	4	4	Croydon 4 p.c. Pref.	97—100	...
130,000	June 20	4	4	Do. 4 p.c. Deb.	95—100	-2
65,000	Aug. 8	8½	7½	Eastbourne 'A' 5 p.c. ...	140—145	...
198,000	,,	7	6	Do. 'B' 3½ p.c.	114—119	-1
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112	...
130,000	June 20	5	5	Do. 5 p.c. Deb.	112—117	...
24,000	Aug. 8	8½	8½	Great Yarmouth 8½ p.c. max.	43—48	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38	...
51,160	June 3	5½	5½	Do. 5½ p.c. Deb.	121—126	...
152,600	Sept. 5	9	8	Guildford Cons.	163—168	...
54,055	,,	5	5	Do. 5 p.c. Pref.	107—112	...
68,250	June 3	5	5	Do. 5 p.c. Deb.	107—112	...
156,600	Aug. 22	7½	7½	Hampton Court Cons. ...	131—136	...
80,000	Aug. 8	4	4	Lea Bridge 4 p.c. Pref. ...	90—95	-4
60,000	,,	6	6	Do. 6 p.c. Pref.	121—126	...
94,876	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
73,620	Sept. 5	8⅝	8⅝	Luton Cons. 'A'	153—163	...
107,960	Sept. 19	5½	4	Mid Kent Ord.	8¼—9¼	...
230,940	Aug. £	10	10	Oxford & District Ord. ...	195—200	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	107—112	...
126,193	May 9	7½	7½	Peterborough Ord.	135—145	...
64,990	Sept. 5	6½	7½	Redditch Ord.	118—128	...
166,850	Aug. 8	8	8	Romford Ord.	142—147	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Sept. 19	5	5	Do. 5 p.c. Deb.	112—117*	...
25,570	Aug. 8	5½	5½	Rugby 5½ p.c. Pref.	120—125	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	104—109	...
42,750	June 3	5½	5½	Do. 5½ p.c. Deb.	118—123	...
110,950	Aug. 22	8	8	Ryde Ord.	140—150	...
270,086	Sept 5	7	7	Slough Ord.	128—133	...
21,000	June 20	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	May 9	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...
28,866	Sept. 5	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/—20/-	...
117,228	Aug. 8	7	5	Swindon C s.	102—107	...
60,425	June 3	5	5	Do. 5 p.c. Deb.	112—117	...
64,380	June 3	5	5	Torquay & Paignton 5 p.c. Pref.	107—112	...
130,000	Aug. 8	8	5	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	100—105	...
82,000	Aug. 8	6	6	Weymouth Ord.	103—108	...
98,384	Aug. 22	6	6	Wolverhampton 6 p.c. Pref.	118—123	...
160,000	June 20	5½	5½	Do. 5½ p.c. Rd. Db.	105—110	...
90,000	June 20	5	5	York 5 p.c. Red. Deb. ...	104—109	...
133,640	July 18	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	118—123	...
120,000	,,	5	5	Do. 5 p.c. Pref.	105—110	...
35,000	June 3	5½	5½	Do. 5½ p.c. Deb.	120—125	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 7.	Rise or Fall on Week.
347,756	July 18	6	5	Bath Cons.	118—120	...
1,667,250	July 18	5	5	Bristol, 5 p.c. max.	111—114	+1½
120,420	June 3	4	4	Do. 1st 4 p.c. Deb. ...	99—101	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	99—101	...
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Aug. 8	5	5	Newport (Mon). 5 p.c. max. ...	97—99	...
13,200	Sept. 19	8⅔	7	Pontyp'l Gas & W. 10 p.c. 'A'	12½—13½*	...
13,600	,,	6	5	Do. 7 p.c. 'B'	11½—12½*	...
40,000	,,	6	5	Do. 7 p.c. 'C'	11½—12½*	...
140,778	Aug. 8	5	5	Weston-super-Mare Cons. ...	108—110	...
64,338	June 20	4	4	Do. 4 p.c. Deb.	100—102	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	151—154	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 7.	Rise or Fall on Week.
157,150	Aug. 8	4½	5	Chester 5 p.c. Ord.	109—111	...
92,500	June 20	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Aug. 22	6	6	Liverpool 5 p.c. Ord. ...	120—122	...
245,500	June 20	5	5	Do. 5 p.c. Red. Pref. ...	97—102	...
306,083	July 18	4	4	Do. 4 p.c. Deb. ...	100—102	...
106,280	Aug. 8	10	10	Preston 'A' 10 p.c.	198—208	...
188,219	,,	7	7	Do. 'B' 7 p.c.	131—141	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 7.	Rise or Fall on Week.
122,577	Aug. 8	8	8	Blyth 5 p.c. Ord.	161—163	+½
732,000	Aug. 22	5	5	Hartlepool G. & W. Co. & New	94—95	...
2,061,315	Aug. 8	5⅛	5	Newcastle & Gateshead Con.	22/—22/9a	-/4½
682,856	,,	4	4	Do. 4 p.c. Pref. ...	99—100	...
776,706	June 20	3½	3½	Do. 3½ p.c. Deb. ...	88—89	-½
277,285	May 9	5	5	Do. 5 p.c. Deb. '43 ...	103½—105½	...
332,351	Aug. 22	6	6	Sunderland 6 p.c. max. ...	135—136	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 7.	Rise or Fall on Week.
542,270	Aug. 8	9	6	Derby Con.	132—143	...
55,000	June 3	4	4	Do. 4 p.c. Deb. ...	100—105	...
20,000	June 20	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
60,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 7.	Rise or Fall on Week.
10,000	Aug. 8	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,606,339	Aug. 22	6½	6½	Sheffield Cons.	129—141	...
95,000	July 4	4	4	Do. 4 p.c. Deb.	101—103	...

a The quotation is per £1 of Stock. * Ex div.

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